

THE AMERICAN ORB-WEAVER GENERA *LARINIA*, *CERCIDIA* AND *MANGORA* NORTH OF MEXICO (ARANEAE, ARANEIDAE)

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ABSTRACT. There are three species of *Larinia* found north of Mexico, one of which, *Larinia directa*, occurs as far south as southern Brazil. The closest relatives are found in Africa. *Cercidia prominens*, possibly introduced from Europe, is found from the Great Lakes region to New England in relatively undisturbed habitats. *Cercidia* and *Larinia* are closely related offshoots of *Araneus*.

While *Mangora* species are found in all parts of the world, most are Neotropical. Of the seven species of *Mangora* found north of Mexico, three are tropical.

As a result of the discovery that *Cercidia funebris* is an older name for *Hypsosinga singaeformis*, this rarely used name must be changed to *H. funebris*.

INTRODUCTION

Revisionary studies of invertebrates try to accomplish several different tasks. The first task is to analyze a group of species and genera so that they can be arranged in phylogenetic order; the second is to devise a guide for the determination of the species; and the third, to discover generalizations of interest to biology. The first two aims are somewhat contradictory, since, in order to provide an ideal phylogenetic system, the group should be studied worldwide.

Nevertheless, I have limited myself to the American fauna because a worldwide study would make the determination of the spiders in North America exceedingly cumbersome, as well as greatly delaying the publication of the results. An additional

problem, which does not plague students of vertebrates, is the difficulty of obtaining sufficient museum specimens of the genera under study, because most collections are not and cannot be sorted to genera. But for nonspecialists to be able to determine spiders of North America is an urgent necessity, as arachnologists all have teaching, research, and curatorial obligations, and do not have time to determine all the specimens submitted by entomologists interested in insect ecology and insect predators. Ironically, a taxonomic revision sometimes is the stimulus for swamping its author with requests for determinations of the studied species.

To facilitate determinations the taxonomic studies of the American orb-weavers will be published in two series: first, the species of araneid genera north of Mexico; later, the very many more species from the rest of the Americas. For the purposes of determination, it is obviously much easier to keep the fauna of America north of Mexico distinct from the rich tropical fauna. However, it is difficult to revise North American species without reference to tropical species and the better known temperate species of Europe. Even though I am limiting this work to the Araneidae of northern parts of North America, I am examining and illustrating all the types of species names from other parts of America to minimize later changes and to get a better idea of the diversity of species and

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genera. Unfortunately, many of these types are known from only one sex or from immatures. Of course, I am also examining specimens from other parts of the world, as they can be found in American collections.

Perhaps it is the broader aspect of the study, the revision of the genera within the family, that makes me uneasy about using the small genera in Grasshoff's excellent studies (1970a, b, c), even though each is a natural group of closely related species. Pending better knowledge of spiders, it may be better and easier to keep genera large. Also, judging from my study, it appears that *Larinia* and *Cercidia* are very closely related to *Araneus*, but *Mangora* is a specialized group far removed from *Araneus*. Nevertheless, for this paper, and until I know more about the groups, I will keep *Larinia* and *Mangora* together, following Simon (1895) and Grasshoff.

Larinia does not rest in the center of the web, but on vegetation to the side, as do most other relatives of *Araneus*. *Mangora* rests in the hub, and, like many other Araneidae that rest in the center (e.g., *Argiope*, *Gasteracantha*, *Acanthepeira*, *Cyclosa*, *Leucauge* and *Micrathena*), is more specialized in structure. Why there should be a relationship between the resting place and the appearance of the spider I do not know, except perhaps for the obvious explanation that an exposed spider would be more subjected by predators to selection pressure favoring inconspicuousness or the ability to disappear rapidly.

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Lowrie, W. Peck of the Exline-Peck collection, S. Riechert, V. D. Roth, R. X. Schick of the California Academy of Sciences, W. Sedgwick, K. Stone, W. Starega of the Polish Academy of Science, F. Wanless and D. Norman of the British Museum (Natural History), H. V. Weems of the Florida State Collection of Arthropods, T. Kronstedt of the Natural History Museum, Stockholm, provided information, and F. Enders transmitted specimens from South American museums. Lorna R. Levi corrected the syntax. The study and its publication were supported in part by National Science Foundation research grant GB-36161.

Larinia Simon

Larinia Simon 1874, *Arachnides de France*, 1: 115.

Type species by monotypy *Epeira lineata* Lucas, 1846. The gender of the generic name is feminine.

Drexelia McCook, 1892, *Proc. Acad. Natur. Sci. Philadelphia* 1892: 127. Type species by monotypy *Epeira directa* Hentz.

In several excellent studies, Grasshoff (1970a, b, c, 1971) split *Larinia* into numerous genera (*Kilima*, *Larinopa*, *Siwa*, *Paralarinia*, *Faradja*, *Mahembea*, *Larinia-ria*), each including related species. But if I were to follow Grasshoff, I would have to make additional new genera for the tropical American species. Perhaps the Grasshoff genera should be considered subgenera (Grasshoff, in letter). Even this would be unsatisfactory, however, as it is not possible to express all phylogenetic relationships through nomenclature. For the time being I prefer to use *Larinia* in its broad sense.

The type species of *Larinia* Simon is *L. lineata*, occurring in the Mediterranean region. It has recently been illustrated by Grasshoff (1970b), as have most species other than American ones. In this discussion I refer to the various papers of Grasshoff.

Description. *Larinia* species are elongate, the abdomen longer than wide, often pointed anteriorly above the carapace and projecting behind and above spinnerets

(Figs. 5, 6). Behind the median eyes the yellowish carapace may have a double line that fuses to a single median longitudinal line. The legs are not banded, but may have ventral and sometimes dorsal black spots. The sternum may be all black, or may have the sides but not the anterior black. The abdomen has a pattern, usually variable within a species, of longitudinal lines, sometimes with two rows of black spots; the sides are white. The venter of the abdomen is gray to black, the dark area surrounds the spinnerets. Anteriorly, the dark area encloses a longitudinal white patch that is often divided by a median black line (Figs. 6, 16, 25). The height of the clypeus equals about the diameter of the anterior median eyes. The carapace has a median longitudinal thoracic line more pronounced in males. There are four teeth on the anterior margin of each chelicera.

Genitalia. The female epigynum has a scape, which I think is torn off in specimens I have examined of *L. lineata* of the Old World. The internal genitalia have a duct connecting the large opening with the seminal receptacles (Figs. 9, 12, 19, 28, and illustrations of Grasshoff's papers). Along the duct are numerous, irregularly placed, kernel-like structures, each connected with the lumen of the connecting duct. Presumably these structures are glands that have the outer layer sclerotized.

The embolus of the palpus is ribbon-shaped with the edge facing mesally, the broad side apically. The embolus tip breaks off during mating and stays behind in the female duct [Figs. 31–33 and Grasshoff, 1970a, fig. 1f for *Larinia (Kilima) conspersa*; 1970b, fig. 7d for *Larinia chloris*; 1971, fig. 33d for *Larinia (Drexelia) trifida*; fig. 38b for *Larinia (Drexelia) bifida*; and fig. 44a for *Larinia (Drexelia) ishango*.] The tip contains a duct (Figs. 31–33). The palpus has a median apophysis projecting to the side of the palpus, a subterminal apophysis and a terminal apophysis (Fig. 3). I am not certain that I have been

consistent in naming the subterminal apophysis in various genera. There is a hematodocha between embolus and radix, and a large distal hematodocha between the sclerotized portion of the terminal and subterminal apophysis and the embolus. In *Kilima*, according to Grasshoff, tegulum and stipes are fused. The structure of the male palpus is so similar to that of *Araneus* that I believe *Larinia* is close to *Araneus*. If this is the case, the tip or cap of the embolus, which breaks off during mating, probably has a lumen in *Araneus* too. Grasshoff found a lumen in the embolus tip of *Araneus*, but I have been unable to confirm its presence in this more sclerotized structure.

Diagnosis. Besides having diagnostic ventral coloration very different from that of *Araneus* and *Metepeira* (which has a white median ventral longitudinal band framed by black), *Larinia* differs from *Araneus* by the eye arrangement. The anterior median eyes are the largest, separated by more than one diameter; the posterior median eyes are subequal to anterior medians or slightly smaller (to 0.8 diameter), and are almost touching or are separated from each other by their radius at most. The anterior median eyes are 1.2 to 1.5 diameters apart. The median ocular quadrangle is more than twice as wide in front as behind (Figs. 5, 15, 24).

Males are smaller than females and have longer legs. In males of American species the palpal femur has a basal ventral tooth (as in *Araneus*); the palpal patella has two long macrosetae (one in *Kilima*, Grasshoff, 1970a); the first coxa lacks a hook (but has one in *Kilima*); the first or second legs have stronger macrosetae than in the female.

Note. Several South American *Eustala* species resemble *Larinia*, including the commonest one, *E. fuscovittata*. However, the genitalia differ; the *Eustala* epigynum has an anteriorly directed scape and the palpus has a large, nonsclerotized median apophysis parallel to the long axis of the appendage. The closeness of the posterior



Plate 1. *Larinia directa*, penultimate female, from North Carolina in the laboratory.

median eyes to each other may be an adaptation to the leg position of the resting animal (Plate 1).

Relationship. I believe this genus is close to *Araneus* but not to *Mangora*. *Larinia* lacks the high carapace and the feathered trichobothria characteristic of *Mangora*, and the structure of the genitalia differs considerably. Traditionally *Larinia* has been placed close to *Mangora*. Archer (1951b: 26) also considered *Larinia* close to *Araneus*.

Grasshoff (1971) shows that the species closest to the North American ones are found in Africa. I assume that of the three species found north of Mexico, *Larinia directa*, with a range extending from southern Brazil to southern United States, is the ancestral one. *Larinia borealis* and *L. famulatoria* appear to be two temperate species, one eastern, one western, derived from *L. directa*. Now the ranges of all three overlap in the southwestern United States.

Natural History. Specimens of *Larinia* are commonly collected by sweeping. *Larinia directa* is found in open areas; it sits in the hub of the web at night and in vegetation to the side of the web by day. (Frontispiece and W. Eberhard, personal communication).

Distribution. Worldwide but absent from central and northern Europe.

Misplaced species. *Larinia forata* Keyserling 1893 (= *Epeira forata* McCook 1893) is *Araneus niveus* (Hentz). NEW SYNONYMY. The specimen has a Marx label "Epeira muraria Mx, Sta. Rosa, Cala. no. 442" and a pencil label by McCook *Epeira forata*. The locality appearing in the publication and on the label is in error; *Araneus niveus* and close relatives are not found in California. The specimen is in the United States National Museum.

Larinia nigrofoliata Keyserling, 1884 = *Araneus miniatus* (Walckenaer, 1841).

Separating species. The three species found in the Nearctic area differ in proportions, size, and in the genitalia (the base and scape of the epigynum, and the shape of the embolus). The palpus is similar and lightly sclerotized in all three species, and the median apophysis has greater variation within each species than among the three species (Figs. 37-46).

KEY TO AMERICAN SPECIES OF *LARINIA* NORTH OF MEXICO

- 1 First patella and tibia of female 1.6 to 2.2 times carapace length, distal rim of epigynal scape wide and smooth (Figs. 7, 10, 11); first patella and tibia of male 2.0 to 2.4 times carapace length, New Jersey, Arkansas, southern Arizona, southern California to southern Brazil (Map 1). *directa*
- First patella and tibia of female 1.2 to 1.6 times carapace length, distal rim of scape not wide and smooth (Figs. 17, 20, 21, 26); first patella and tibia of male 1.4 to 1.7 times carapace length. 2
- 2(1) Sternum black, venter of abdomen with black marks (Fig. 25); females with transverse striations on base of scape, and lateral lip of epigynal base diagonal (Figs.



Map 1. Distribution of *Larinia directa* (Hentz).

26, 29, 30); total length of males less than 3.3 mm; Wyoming, Idaho, southern California to Chiapas (Map 2). *fanulatoria* Sternum with sides black at darkest, venter of abdomen with gray marks (Fig. 16); females with striations of scape curved posteriorly at middle, and lateral lip of epigynal base framing opening laterally and posteriorly forming a right angle (Figs. 17, 20, 21); total length of males more than 3.9 mm long; New England, southern Canada to eastern Washington, south to Virginia, New Mexico and Chihuahua (Map 2).

Larinia directa (Hentz)

Frontispiece, Plate 1; Figures 1–12, 31, 34, 37–41; Map 1

Epeira directa Hentz, 1847, J. Boston Soc. Natur. Hist., 5: 478, pl. 31, fig. 21, ♀. Type speci-

mens from South Carolina and Alabama destroyed.

Epeira rubella Hentz, 1847, J. Boston Soc. Natur. Hist., 5: 478, pl. 31, fig. 22, ♀. Type specimens from Alabama destroyed.

Epeira tetragathoides O. P.-Cambridge, 1889, Biologia Centrali-Americana, Araneidea, 1: 16, pl. 7, figs. 9–10, ♀♂. Female, male syntypes from Guatemala and Panama in the British Museum, Natural History. Name preoccupied by *E. tetragathoides* Walckenaer.

Epeira intercisa O. P.-Cambridge, 1889, Biologia Centrali-Americana, Araneidea, 1: 18, pl. 5, fig. 11, ♂. Male holotype from Bugaba, Panama in the British Museum, Natural History, lost.

Drexelia directa, –McCook, 1892, Proc. Acad. Natur. Sci. Philadelphia, 127. McCook, 1893, American Spiders, 3: 249, pl. 6, figs. 10, 11, pl. 22, fig. 3, ♀. F. P.-Cambridge, 1903, Biologia Centrali-Americana, Araneidea, 2: 461, pl.

- 43, figs. 12, 13, ♀, ♂. Roewer, 1942, *Katalog der Araneae*, 1: 764. Bonnet, 1956, *Bibliographia Araneorum*, 2: 1609. Grasshoff, 1971, *Senckenbergiana Biol.*, 52: 93, fig. 45, ♀.
- Epeira deludens* Keyserling, 1893, *Spinnen Amerikas*, 4: 261, pl. 13, fig. 195, ♀, ♂. Male and female syntypes from Florida and Guatemala (Marx collection) in the U.S. National Museum, examined.
- Larinia bellona* Banks, 1898, *Proc. California Acad. Sci.*, ser. 3, 1(7): 257, pl. 15, fig. 6, ♀, ♂. Female, male syntypes from Tepic, Mexico in the Museum of Comparative Zoology, examined. NEW SYNONYMY.
- Larinia directa*. — Emerton, 1902, *Common Spiders*, p. 182, figs. 424–427, ♀, ♂. Comstock, 1912, *Spider Book*, p. 508, fig. 545, ♀. Comstock, 1940, *Spider Book*, rev. ed., p. 521, fig. 545, ♀.
- Larinia cymotypa* Chamberlin, 1924, *Proc. California Acad. Sci.*, 12: 649, fig. 93. Female holotype from Gulf of California in the California Academy of Sciences, examined. NEW SYNONYMY.
- Larinia albonigra* Franganillo, 1934, *Mem. Soc. Cubana Hist. Natur.*, 8: 158. Male holotype from Cuba in Cuban Academy of Science, Havana, but with code number only, and no key to code. Franganillo, 1936, *Los Arácnidos de Cuba*, 81, fig. 38, ♂. NEW SYNONYMY.
- Drexelia octopunctata* di Caporiaco, 1955, *Acta Biol. Venezuelica*, 1: 349. Female holotype from Caracas in the Museo de Biol. Universidad Central, Caracas, examined. NEW SYNONYMY.
- Larinia nigrovittata* Mello-Leitão, 1947, *Bol. Mus. Nac.*, Rio de Janeiro, 80: 12, figs. 26, 27, ♂. Male holotype from Carmo do Rio Claro, Minas Gerais, Brazil in the Museu Nacional, Rio de Janeiro, examined. NEW SYNONYMY.

Note. The Franganillo illustration, made from a squashed palpus on a microscope slide, matches a palpus similarly deformed accidentally. This species is common in Cuba.

Description. Female from Alabama: sternum gray around margin. Dorsum of abdomen with a light median longitudinal band bordered by indistinct darker bands.

Total length 11.5 mm. Carapace 3.7 mm long, 2.4 mm wide. First femur, 4.3 mm; patella and tibia, 6.6 mm; metatarsus, 5.5 mm; tarsus, 1.8 mm. Second patella and tibia, 6.0 mm; third, 2.9 mm; fourth, 5.1 mm.

Male from Alabama: color like that of female. Total length 7.5 mm. Carapace 3.4 mm long, 2.2 mm wide. First femur, 4.8 mm; patella and tibia, 7.2 mm; metatarsus, 6.5 mm; tarsus, 2.0 mm. Second patella and tibia, 6.4 mm; third, 2.9 mm; fourth, 5.1 mm.

Variation. Total length of females, 4.8 to 11.7 mm; carapace 1.9 to 3.7 mm long, 1.5 to 2.4 mm wide; first patella and tibia 3.7 to 7.3 mm long. First patella-tibia 1.6 to 2.2 times the length of the carapace. Abdomen length two to three times its width. Total length of males varies 4.5 to 6.5 mm, carapace 1.9 to 2.9 mm long, 1.3 to 1.9 mm wide; first patella and tibia 4.1 to 6.5 mm long. First patella-tibia 2.0 to 2.4 times carapace length.

The size does not vary geographically; the leg length does not vary geographically or with absolute size. Very large individuals were found throughout the range of the species.

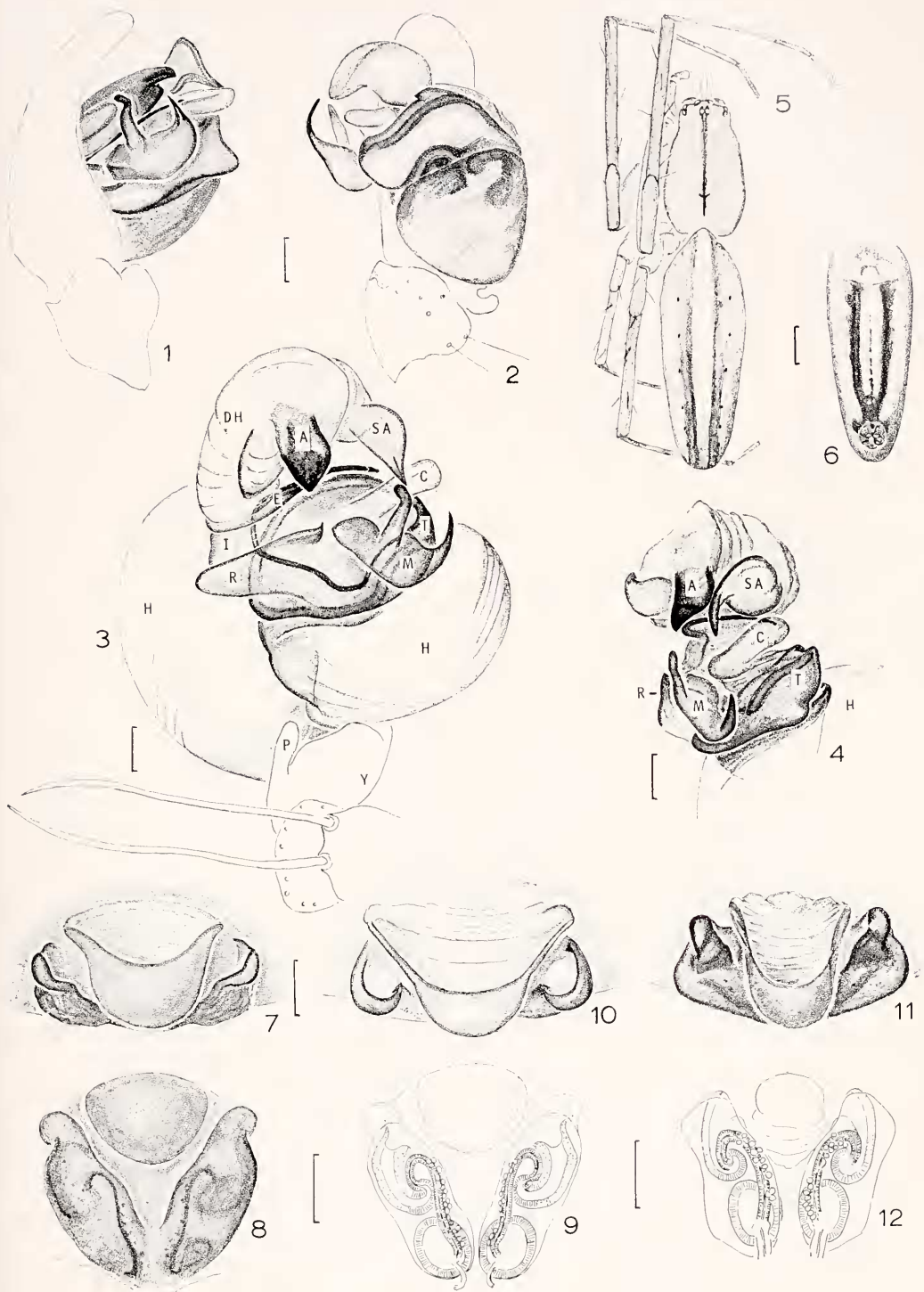
The color and markings of the abdomen are variable: there may be a median longitudinal band (Fig. 5) and there may be paired black spots, or these may be absent. There may be black spots on some leg articles. The shape of the abdomen varies greatly but no measurements were made.

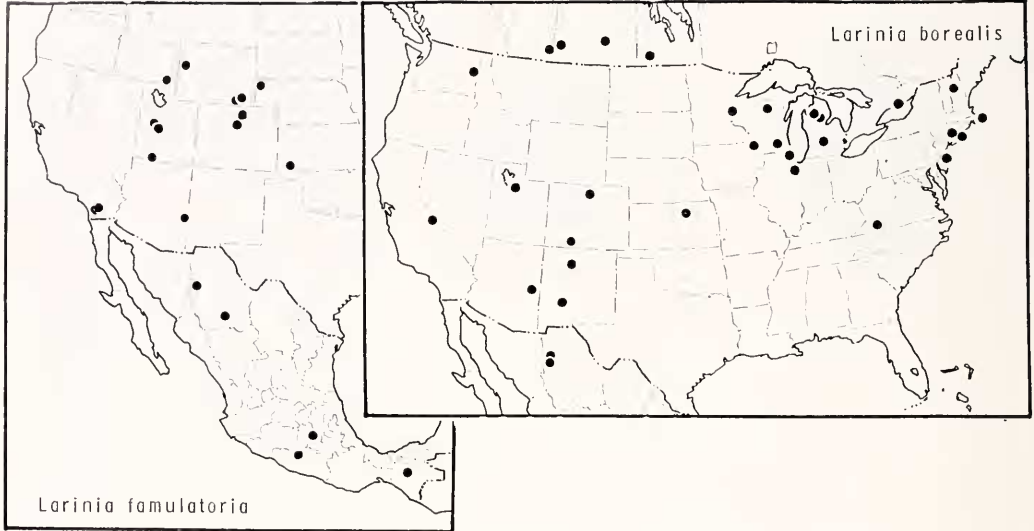
The genitalia are as variable as the size and coloration. The scape may be narrower than long or wider than long, and there is comparable variation in the proportions of the median apophysis.

Figures 1–12. *Larinia directa* (Hentz). 1–4. Left male palpus; 1. Mesal, 2. Ventral, 3, 4. Expanded, 3. Bulb, mesal view, 4. Bulb, ventral view. 5, 6. Female; 5. Dorsal, 6. Abdomen, ventral. 7–12. Epigynum; 7, 10, 11. Ventral, 8, 9, 12. Posterior, 9, 12. Cleared. 7–9: (Alabama). 10: (California). 11, 12: (Florida).

Abbreviations. A, terminal apophysis; C, conductor; DH, distal hematodocha; E, embolus; H, basal hematodocha; I, stipes; M, median apophysis; P, paracymbium; R, radix; SA, subterminal apophysis; T, tegulum; Y, cymbium.

Size indicators: 0.1 mm, except Figures 5, 6, 1.0 mm.





Map 2. Distributions of *Larinia borealis* Banks and *L. famulatoria* (Keyserling).

Diagnosis. Both males and females have much longer legs than do other species. The first patella-tibia of the female is 1.6 to 2.2 times carapace length (Fig. 5), of the male 2.0 to 2.4 mm. The scape of the epigynum has an unusual, wide rim distally (Figs. 7, 10, 11). The embolus is flatter than that of other species (Figs. 1, 34).

Natural History. *Larinia directa* females are mature throughout the season and adult males have been collected from March to September. The oblique web is found in grass and on herbs (Comstock, 1940). Very few specimens have data on habits: it has been collected in grass in Louisiana, an old field in North Carolina, a cotton field in Arkansas, a pine forest in Chiapas and a banana plantation in Panama. In Cali, Colombia specimens are found in weedy fields and the web is made in the evening

(Frontispiece and W. Eberhard, personal communication).

Distribution. From Lakehurst, New Jersey (J. and W. Ivie), 27 June 1964, to southern California, south to Brazil (Map 1).

Larinia borealis Banks

Figures 13–21, 32, 35, 42–44; Map 2

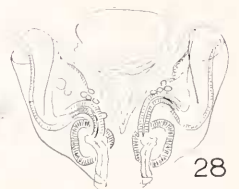
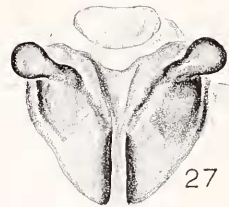
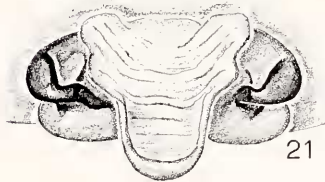
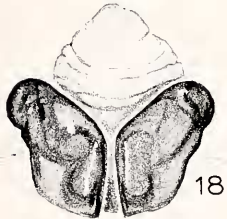
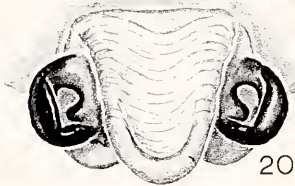
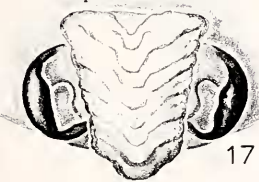
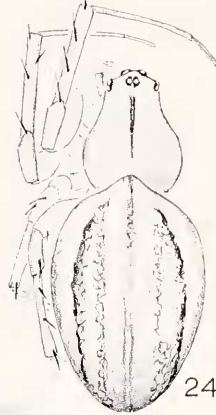
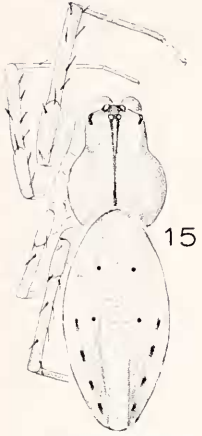
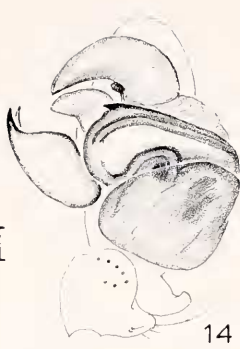
Larinia borealis Banks, 1894, Entomol. News, 5: 8. One female, two juvenile syntypes from Franconia, New Hampshire in the Museum of Comparative Zoology, examined. McCook, 1894, American Spiders, 3: 247, pl. 22, figs. 1, 2, ♀, ♂. Comstock, 1912, Spider Book, p. 508. Comstock, 1940, Spider Book, rev. ed., p. 521. Roever, 1942, Katalog der Araneae, 1: 772. Kaston, 1947, Connecticut Geol. Nat. Hist. Surv., 70: 228, figs. 732–733, ♀. Bonnet, 1957, Bibliographia Araneorum, 2(3): 2348.

Drexelia borealis. –Grasshoff, 1971, Senckenbergiana Biol., 52: 89, fig. 40, ♀, ♂.

Figures 13–21. *Larinia borealis* Banks. 13, 14. Left palpus; 13, Mesal. 14. Ventral. 15, 16. Female; 15. Dorsal, 16. Abdomen ventral. 17–21. Epigynum; 17, 20, 21. Ventral, 18, 19. Posterior, 19. Cleared. 17–18: (New Hampshire). 19: (Alberta). 20: (Saskatchewan). 21: (Utah).

Figures 22–30. *Larinia famulatoria* (Keyserling). 22, 23. Palpus; 22. Mesal, 23. Ventral. 24, 25. Female; 24. Dorsal, 25. Abdomen, ventral. 26–30. Epigynum; 26, 29, 30. Ventral, 27, 28. Posterior, 28. Cleared. 26–28: (Idaho). 29: (Colorado). 30: (Utah).

Size indicators: 0.1 mm, except Figures 15, 16, 24, 25, 1.0 mm.



Description. Female syntype: proximal part of labium and endites dark brown. Sternum dark brown. Dorsum of abdomen with a median dorsal light band and four pairs of small black streaks posteriorly (Fig. 15). Venter between epigynum and spinnerets dark, enclosing two white longitudinal streaks (Fig. 16). Total length 5.3 mm. Carapace 2.1 mm long, 1.5 mm wide. First femur, 2.1 mm; patella and tibia, 2.7 mm; metatarsus, 1.9 mm; tarsus, 0.8 mm. Second patella and tibia, 2.4 mm; third, 1.4 mm; fourth, 2.3 mm.

Description of male from Manitoba: total length 5.4 mm. Carapace 2.6 mm long, 1.9 mm wide. First femur, 2.7 mm; patella and tibia, 3.5 mm; metatarsus, 2.7 mm; tarsus, 1.0 mm. Second patella and tibia, 3.0 mm; third, 1.7 mm; fourth, 3.0 mm.

Variation. The abdominal coloration is as variable as that of *Larinia directa*. Rarely are there paired, median dorsal black marks. Females varied from 4.5 to 8.0 mm in total length, carapace 1.7 to 3.0 mm long, 1.4 to 2.3 mm wide; first patella and tibia, 2.3 to 4.3 mm long; ratio of first patella and tibia length to carapace 1.2 to 1.6. The length of the abdomen is about twice its width. Males 3.9 to 5.4 mm in total length, carapace 1.7 to 2.5 mm long, 1.3 to 1.9 mm wide; first patella and tibia, 2.9 to 3.5 mm long; ratio of first patella and tibia to carapace 1.4 to 1.7.

Diagnosis. The epigynum of *L. borealis* differs from that of *L. directa* by the narrow posterior rim of the scape and by the medially, posteriorly directed basal wrinkles on the scape (Figs. 17, 20, 21) from *L. famulatoria*. It differs from both species in that the lip of the opening in ventral view makes a right angle, bordering the depression both laterally and posteriorly (Figs. 17, 20, 21). The male differs from *L. directa* by having shorter legs and from *L. famulatoria* having less distinct markings ventrally. Unlike the lobed embolus of *L. famulatoria*, the embolus of *L. borealis* tapers to its tip (Figs. 13, 35).

Natural History. *Larinia borealis* has

been collected by sweeping an old field and in a pine forest in Michigan, from dry limy prairie, by sweeping herbs, from tall grasses, from a sandy area in Wisconsin, and by sweeping pines in Illinois. Adult males have been collected from May to October.

Distribution. New England, southern Canada to eastern Washington south to Virginia, Kansas and Chihuahua (Map 2).

Larinia famulatoria (Keyserling)

Figures 22–30, 33, 36, 45, 46; Map 2

Epcira famulatoria Keyserling, 1883, Verhandl. Zool. Bot. Gesell. Wien, 32: 201, pl. 15, fig. 6, ♀. Female holotype from Colorado in the Naturhistorisches Museum, Vienna, lost. Female neotype here designated from Fort Collins, Colorado, in the Museum of Comparative Zoology. Keyserling, 1893, Spinnen Amerikas, 4: 231, pl. 11, fig. 172, ♀.

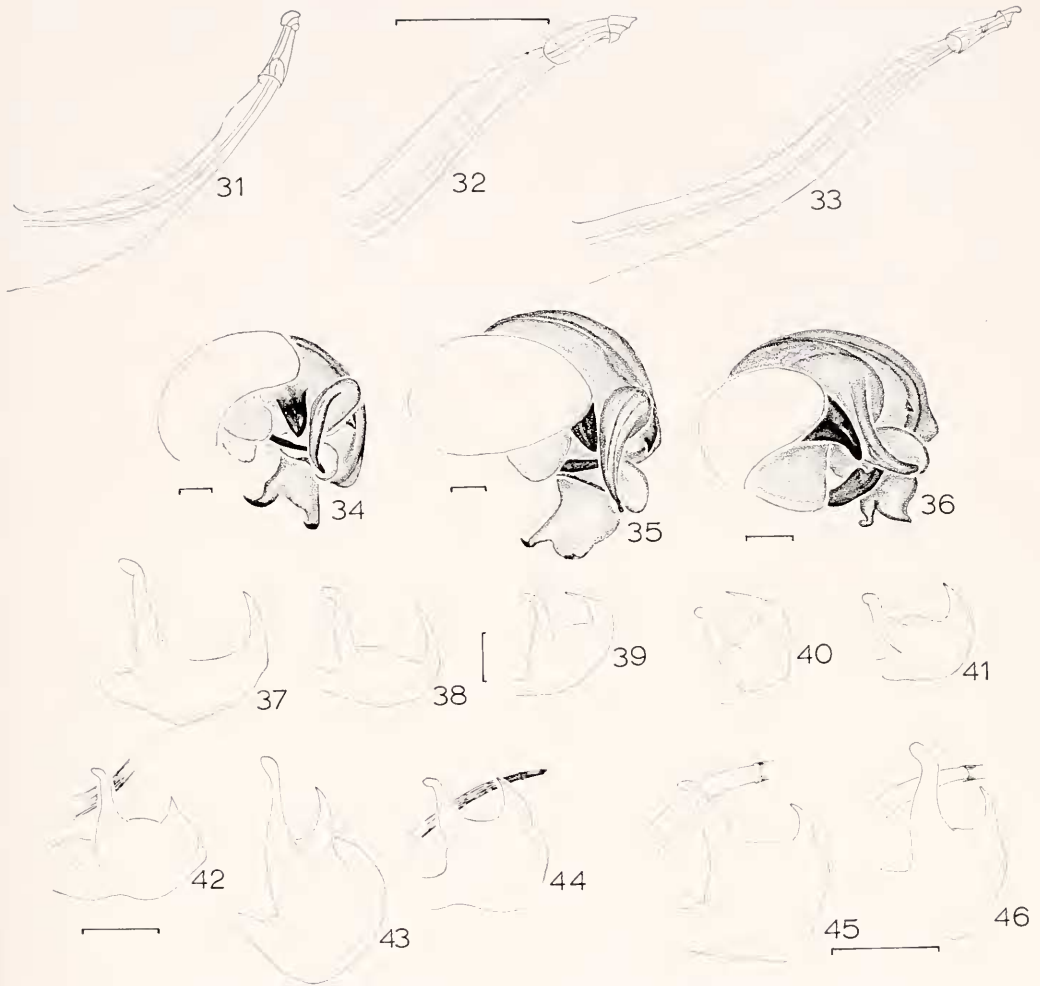
Epcira mormon Keyserling, 1892, Spinnen Amerikas, 4: 182, pl. 9, fig. 134, ♀. Two female syntypes from "District of Columbia" Marx collection (type locality in error) in the U. S. National Museum, examined. Keyserling reports as type specimens one from Utah, one from District of Columbia. McCook, 1893, American Spiders, 3: 164, pl. 6, fig. 5, ♀. NEW SYNONYMY.

Aranea mormon, –F. O. P.-Cambridge, 1904, Biologia Centrali-Americana, 2: 517, pl. 51, fig. 1, ♀. Roever, 1942, Katalog der Araneae, 1: 861.

Larinia famulatoria, –Comstock, 1912, Spider Book, p. 509; Comstock, 1940, Spider Book, rev. ed., p. 522. Roever, 1942, Katalog der Araneae, 1: 772. Bonnet, 1957, Bibliographia Araneorum, 2: 2349.

Araucis mormon, –Bonnet, 1955, Bibliographia Araneorum, 2: 546.

Description. Female from Idaho: labium posteriorly black, sternum black. Legs often with a line of black dots on venter of femora (Fig. 25). Dorsum of abdomen with indistinct longitudinal bands, the lateral ones having dark lateral borders (Fig. 24). Venter black between epigynum and around spinnerets, enclosing a longitudinal white band, which is broken in the center by a black line (Fig. 25). Total length 5.4 mm. Carapace 2.2 mm long, 1.5 mm wide. First femur, 1.8 mm; patella and tibia, 2.4 mm; metatarsus, 1.9 mm; tarsus,



Figures 31-33. *Larina* left virgin embolus with cap; 31. *L. directa*, 32. *L. borealis*, 33. *L. famulatoria*. Figures 34-36. *Larina* left palpus in apical view; 34. *L. directa*, 35. *L. borealis*, 36. *L. famulatoria*. Figures 37-46. *Larina*, median apophysis of left palpus; 37-41. *L. directa*; 37: (North Carolina). 38, 39: (Florida). 40: (Jamaica). 41: (Colombia). 42-44. *L. borealis*; 42: (Michigan). 43: (Saskatchewan). 44: (Massachusetts). 45, 46: *L. famulatoria*, (Utah).

Size indicators: 0.1 mm.

0.8 mm. Second patella and tibia, 2.2 mm; third, 1.4 mm; fourth, 2.2 mm.

Male: total length 3.5 mm. Carapace 1.7 mm long, 1.3 mm wide. First femur, 1.9 mm; patella and tibia, 2.2 mm; metatarsus, 1.9 mm; tarsus, 0.7 mm. Second patella and tibia, 2.1 mm; third, 1.2 mm; fourth, 1.9 mm.

Variation. Unlike *Larina directa* and *L. borealis*, *L. famulatoria* has the dorsal ab-

dominal pattern alike in all well-preserved specimens. Females varied from 3.2 to 5.6 mm total length, 1.4 to 2.1 mm carapace length, 1.2 to 1.4 mm carapace width and first patella and tibia 1.7 to 2.6 mm. Males varied from 2.9 to 3.3 mm total length, carapace 1.4 to 1.7 mm long, 1.1 to 1.2 mm wide, first patella and tibia 2.0 to 2.3 mm. The ratio of first patella and tibia to carapace length varied 1.1 to 1.3 in females.

1.4 to 1.5 in males. The length of the abdomen is about 1.2 to 1.5 times its width.

Diagnosis. Females and males can be separated from those of *L. directa* by the much shorter first patella and tibia (Fig. 24). *Larinia famulatoria* differs from *L. borealis* by the wider, shorter abdomen (Fig. 24), the ventral pattern (Fig. 25) and the genitalia. Females have the sides of the scape almost parallel, with the basal striations transverse (Figs. 26, 29, 30), while the scape of *L. borealis* tapers to the tip and the chevron-shaped basal striations point toward the tip. The males of *L. famulatoria* are shorter in total length than males of *L. borealis*. In the male of *L. famulatoria*, the embolus is thicker and wider than the prongs of the median apophysis (Fig. 22); in lateral view the embolus is much narrower in *L. borealis* and *L. directa* when viewed from the side. The tip of the embolus below the cap has a lobe that is easily seen in apical view (Fig. 36). The lobe may be transparent, but is not present in other species.

Distribution. Wyoming, Idaho, western Kansas to southern California and to southern Mexico (Map 2).

Cercidia Thorell

Cerceis Menge, 1866, *Schrift. Naturf. Gesell. Danzig, neue Folge*, 1: 80. Type species by monotypy: *Cerceis prominens* (Westring). Name is preoccupied by *Cerceis* Rafinesque, 1815, a polychaete, *Cerceis* Milne Edwards, 1840, a crustacean, and *Cerceis* Gistel, 1848, a mollusk.

Cercidia Thorell, 1869, *On European Spiders*, p. 58. Type species designated by Thorell, 1869 and by monotypy *Epeira prominens* Westring. The generic name is of feminine gender.

Description. The eyes are relatively closely spaced, as in small species of *Araneus*. The abdomen is oval, widest in the middle and slightly pointed anteriorly (Fig. 53). The legs are short, the fourth longest with very few macrosetae.

The genitalia of both sexes are heavily sclerotized. The epigynum has a scape bearing setae (Fig. 55). The internal geni-

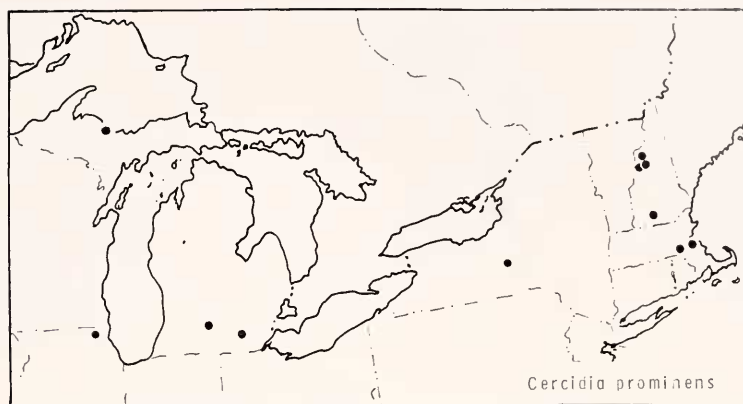
talia are heavily sclerotized and complex (Fig. 57).

The male palpus (Figs. 47-49) is like that of small species of *Araneus*. As far as can be determined it lacks the embolus cap. The embolus tip is hidden below the terminal apophysis and behind the conductor. There are two macrosetae on the palpal patella. Males are slightly smaller than females, have a slightly longer and more sclerotized scutum on the abdomen. The first coxa has a distal, retrolateral hook which fits into a groove of the second femur. The second tibia is modified by bearing macrosetae on its anterior surface.

The genitalia of *Cercidia prominens* are surprisingly similar to that of *Araneus pratensis* (Emerton) (Levi, 1973, *Bull. Mus. Comp. Zool.* 145 (9), figs. 21-31) and I think that *C. prominens* is closely related to this species. But *C. prominens* differs by being more sclerotized, having a high clypeus and having fourth leg longer than first.

Diagnosis. *Cercidia* can be separated from *Araneus* and other araneid genera by the oval, anteriorly slightly-pointed abdomen, and the dorsal abdominal scutum, with its line of short, dark macrosetae around the anterior end. The height of the clypeus is 2.5 times the diameter of the anterior median eyes, while in most related Araneidae, the clypeus is about equal to the eye diameter. The fourth legs are slightly longer than the first.

Note. Sclerotization is commonly found in very small spiders that live in the soil, an adaptation to increased surface per volume, presumably protecting against water loss. Sclerotization is found also in those araneids which stay in the center of the web at midday, exposed to sunlight (e.g., *Gasteracantha*, *Micrathena*). The high clypeus perhaps is correlated with sclerotization, but it is not found in *Gasteracantha* or *Micrathena*. *Cercidia prominens* makes its small webs above the ground, often in open areas. *Pronous*, the only araneid I know to practice a similar habit, is not



Map 3. Distribution of *Cercidia prominens* (Westring) in North America.

sclerotized, but *Pronous* is found in moist tropical forests in Central and South America.

Micrathena has the fourth legs longer than the first, presumably to permit its peculiar resting position in the center of the vertical web, with the abdomen held horizontal, dorsum parallel to the ground. I do not know the significance of long fourth leg in *Cercidia*, but I do not know its resting position.

Cercidia prominens is the only species definitely belonging to the genus. It is probably European in origin, having been accidentally introduced to the northeastern states of North America.

Misplaced species. Simon (1889, J. Asiatic Soc. Bengal, 58, Suppl., p. 382) described males and females of *C. punctigera* from Bengal. Its placement is unknown. I doubt that it belongs to *Cercidia*. It has never been illustrated.

Archer (1951a) placed *Epeira albostriata* Keyserling of South America in *Cercidia*. But this species belongs in the genus called *Lariniacantha* by Archer (1951a). *Epeira albostriata* is the type species of the Mello-Leitão (1933) genus *Parepeira*, and is close to what O. P.-Cambridge (1889) called *Alpaida*. The species is not close to *Cercidia* at all.

Cercidia funebris Keyserling, 1892, Spinnen Amerikas, 4: 37, pl. 2, fig. 32, ♀.

Female holotype from Crescent City, Florida (locality doubtful, as the specimen is from the Marx collection) belonging to the U. S. National Museum, but kept in the American Museum of Natural History, was examined and is *Hyposinga singaeformis* (Scheffer, 1903), NEW SYNONYMY. The Keyserling name is older, and as the Scheffer name has been used less than ten times, it will have to be placed in synonymy with *Hyposinga funebris* (Keyserling, 1892), NEW COMBINATION.

Cercidia octomaculata Mello-Leitão, 1945, Rev. Mus. La Plata, 4: 236, fig. 10, ♀. Female holotype from Pindapoy, Misiones, Argentina in the La Plata Museum, examined. It belongs to the genus *Alpaida*.

Cercidia prominens (Westring)

Figures 47–57; Map 3

Epeira prominens Westring, 1851, Göteborg Kongl. Vetenskap Handl., 2: 35. Male type from Sweden. In the dry Westring Collection of the Swedish Museum of Natural History, Stockholm, there are two specimens, male and female.

Epeira bella Meade, 1861, Ann. Mag. Natur. Hist., ser. 3, 7: 20. Male and female holotypes from near Bicester, Oxfordshire, England, depository unknown.

Singa scutifera Westring, 1861, Araneae Svecicae, p. 66. Female holotype from Sweden. In the dry collection of Westring in the Swedish Museum of Natural History there are some specimens, probably labeled by Thorell.

Atea spinosa Oblert, 1865, Programm Realschule Königsberg, 9 (publication unavailable).

Cercis prominens, — Menge, 1866, Schrift. Naturf. Gesell. Danzig, neue Folge, 1: 80, pl. 13, fig. 21 ♀, ♂.

Miranda cavinata Giebel, 1869, Z. gesamt. Naturwiss. 34: 301. Female holotype from Vierwaldstädter See, Switzerland in the University Museum Halle, not examined.

Cercis prominens, — Thorell, 1869, On European Spiders, p. 49, 58. Comstock, 1912, Spider Book p. 455. Emerton, 1913, Trans. Connecticut Acad. Sci., 18: 219, pl. 2, fig. 11, ♀. Wiehle, 1931, in Dahl, Tierwelt Deutschlands, 23: 25, figs. 10, 30–32, ♀, ♂. Comstock, 1940, Spider Book, rev. ed., p. 469. Roewer, 1942, Katalog der Araneae, 1: 865. Kaston, 1948, Connecticut Geol. Natur. Hist. Surv., 70: 227, fig. 731, ♀. Archer, 1951, Am. Mus. Novitates, no. 1487: 42. Locket and Millidge, 1953, British Spiders, 2: 159, fig. 106, ♀, ♂.

Araneus prominens. — Bonnet, 1955, Bibliographia Araneorum, 2: 568.

Description. Female from England: specimens in alcohol have carapace orange-brown with a dark thoracic spot. Sternum dark brown, legs orange-brown, dorsum of abdomen orange-brown with a median longitudinal light band indistinctly bordered and four dark spots on the anterior of scutum. Under the scutum is a reticulate pattern (Fig. 53). Sides of abdomen orange; venter very dark between epigynum and spinnerets, and on sides of dark area is a white pigment band, which grades into the darker sides. Eyes subequal in size. Anterior median eyes slightly more than their diameter apart, slightly more than their diameter from laterals. Posterior median eyes their diameter apart, slightly less than two from laterals. Chelicerae heavy, with four teeth on anterior margin, two or three on posterior. Total length 5.4 mm. Carapace 2.2 mm long, 1.6 mm wide. First patella and tibia, 1.7 mm; second, 1.5 mm; third, 1.1 mm. Fourth femur, 1.6 mm; patella and tibia, 1.9 mm; metatarsus, 1.1 mm; tarsus, 0.7 mm.

Male: coloration like that of female, but sclerotized parts, including the carapace darker. Thoracic area with very slight depression with a dark spot. Eye sizes as in female, slightly farther apart. Clypeus as in female. Abdomen with a dorsal shield,

lightly sclerotized, which covers three-quarters of abdomen. Total length 3.9 mm. Carapace 2.0 mm long, 1.7 mm wide. First patella and tibia, 1.7 mm; second, 1.5 mm; third, 1.1 mm. Fourth femur, 1.4 mm; patella and tibia, 1.7 mm; metatarsus, 0.9 mm; tarsus, 0.7 mm.

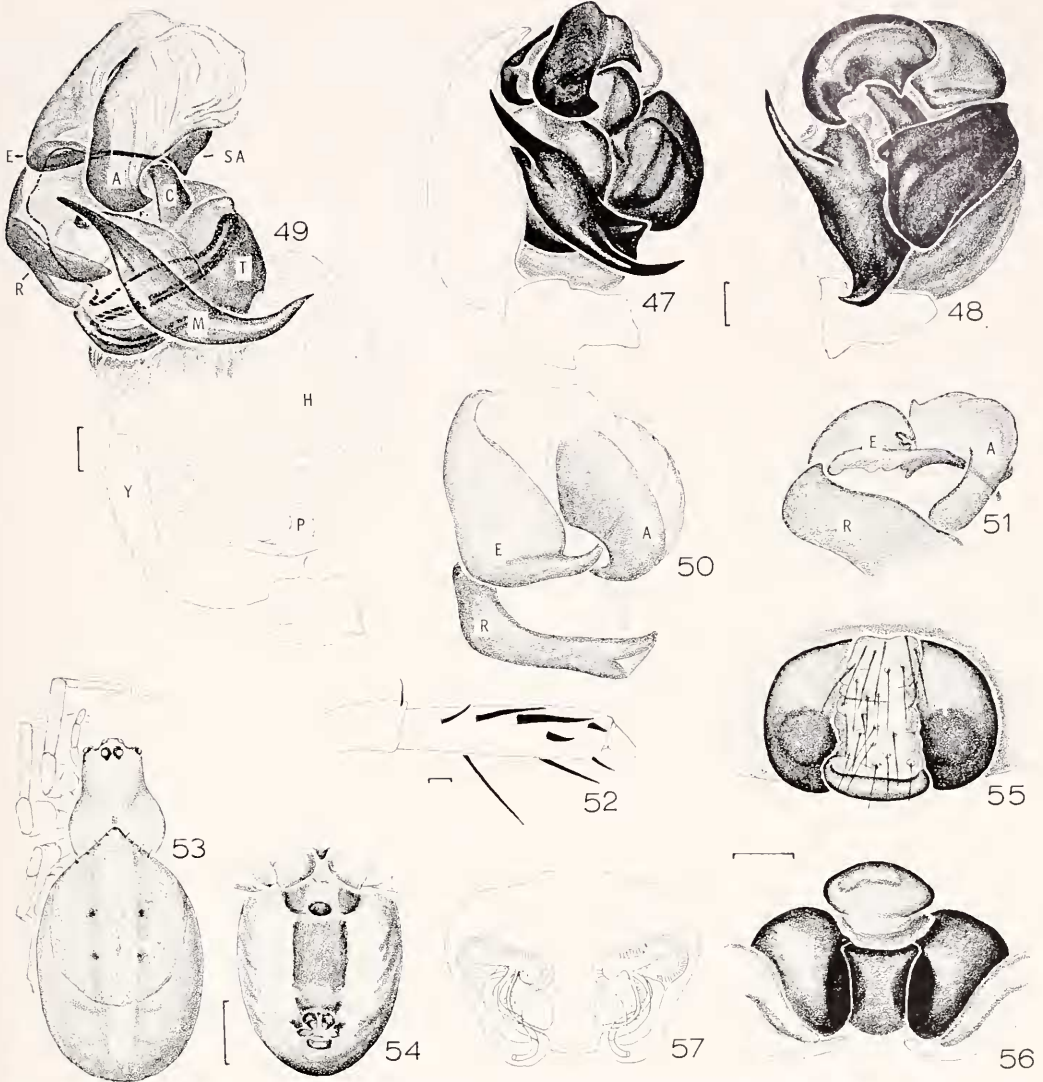
Variation. Females collected in North America varied from 3.8 to 4.6 mm in total length, carapace 1.7 to 2.1 mm long, 1.4 to 1.6 mm wide. Males varied from 3.6 to 4.1 mm in total length, carapace 1.7 to 1.9 mm long, 1.4 to 1.6 mm wide.

Note. The color of living specimens is orange-red. The illustrations were made from specimens collected in England.

Natural History. Adult males have been collected in May, July and November in North America; adult females from May to November. The only one I ever found was hanging on a thread in a low bush in the relatively open vegetation of the top of North Pack Monadnock Mountain in New Hampshire. Unfortunately, I placed it in alcohol, thinking it was an unusually colored specimen of *Araniella displicata*. Other specimens came from "sifting" and a tamarack bog.

According to Wiehle (1931), *Cercidia prominens* is found below 300 m elevation in Central European mountains, the hub of the web is 4 to 6 cm above the ground, and the web is between grasses, low plants, mosses or litter and may be in open areas as well as in forest. Wiehle found it difficult to collect *C. prominens* except by searching carefully above the ground or by sifting litter.

The web is made in the afternoon and removed late in the morning, even though not damaged. The orb has between 12 and 21 radii and the diameter of the viscid thread area is 50 to 60 mm. The center is open and there are 18 viscid turns above the hub, 27 below, both crossing radii for about 19 mm distance, the threads below being spaced closer than those above. The spider rests in the center and there is no retreat. If disturbed the spider shakes the



Figures 47-57. *Cercidia prominens* (Westring). Figures 47-51. Left palpus; 47. Mesal, 48. Ventral, 49-51. Expanded; 49. Bulb in submesal view, 50. Apical view, 51. Radix and embolus viewed from below. 52. Left second tibia, prolateral. 53, 54. Female; 53. Dorsal view, 54. Ventral. 55-57. Epigynum; 55. Ventral, 56. Posterior, 57. Dorsal, cleared.

Abbreviations. A, terminal apophysis; C, conductor; E, embolus; H, basal hematodocha; M, median apophysis; P, paracymbium; R, radix; T, tegulum; Y, cymbium.

Size indicators: 0.1 mm, except Figures 53, 54, 1.0 mm.

web before dropping and disappearing in the ground litter. Males and females are mature until fall (Wiehle, 1931).

The spherical egg sac is of orange curled threads, somewhat similar to that of *Ero* without a stalk, and contains 15 orange,

relatively large, eggs. The eggs overwinter in litter (Menge, 1866).

Individuals just leaving the egg sac have three black spots on the posterior end of the dorsal side of the abdomen (Wiehle, 1931).

Distribution. Michigan, New Hampshire and Massachusetts (Map 3). Although difficult to collect (Wichle, 1931), this spider is so conspicuous that its spotty distribution is puzzling. Its occurrence in the Lake States and New England suggests that the species has been introduced. But one would not expect an introduced species to be found in the Moosilauke region and on North Pack Monadnock Mountain in New Hampshire. West Quincy, (where the species was first collected in 1877) and Holliston, Massachusetts, and Marquette, Michigan are localities more characteristic of an introduced animal.

Records. Massachusetts. Norfolk Co.: West Quincy, 15 Nov. 1877, ♀ (J. H. Emerton). Middlesex Co.: Holliston, 2 May 1926, ♀ (E. B. Bryant); May, June-July, Sept., Nov. 1923, ♀♂ (J. H. Emerton). *New Hampshire.* Grafton Co.: Moosilauke, 4 July 1912, ♂ (E. B. Bryant); North Woodstock, Sept. 1911, ♀ (W. Fox); Franconia, ♀♂ (N. Banks). Hillsboro Co.: North Pack Monadnock Mtn., Oct. 1972, ♀ (H. W. Levi). *New York.* Tompkins Co.: McLean, 29 May 1937, ♂ (Gerberg, Greenspan). *Michigan.* Lenawee Co.: Burke Lake, Clinton, swept, 22 May 1970, ♂ (N. Platnick). Marquette Co.: Marquette, 26, 29 July 1932, ♀♂ (A. M. Chickering); Calhoun Co.: Marshall, tamarack swamp, 11 May 1935, ♀ (A. M. Chickering). *Illinois.* Lake Co.: Volo bog, 27 April 1935, 2 ♀ (D. C. Lowrie).

There are also specimens from England, Germany, Denmark, Poland, Switzerland and France in American collections.

Mangora O.P.-Cambridge

Mangora O. P.-Cambridge, 1889, *Biologia Centrali-Americana*, 1: 13. The type species is *Mangora picta* O. P.-Cambridge from Guatemala, designated by Simon, 1895, *Histoire Naturelle des Araignées*, 1: 793. The generic name is feminine. *Abbotia* McCook, 1894, *American Spiders*, 3: 239. Type species *Mangora gibberosa* (Hentz), designated by F. P.-Cambridge, 1904, *Biologia Centrali-Americana, Araneidea*, 2: 477. The generic name is preoccupied by Leach, 1830 for a Coleopteran.

Prasonica Simon, 1895, *Histoire Naturelle des Araignées*, 1: 794. The type species is *P. albolimbata* Simon, 1895 from Madagascar by original designation. The type specimen is a juvenile in the *Muséum National d'Histoire Naturelle*, examined. NEW SYNONYMY.*

Psyllo Thorell, 1899, *Bihang. Kongl. Svenska Vetenskap. Akad. Handl.*, 25: 39. The type species is *Psyllo nitida* Thorell, 1899 from Cameroon by monotypy. Female holotype in the Stockholm Natural History Museum, examined. NEW SYNONYMY.*

Abbotiana Strand, 1929, *Acta Univ. Latviensis*, 20: 10. New name for *Abbotia* McCook, a pre-occupied name.

Description. The carapace is pear-shaped, highest in the thoracic region, and quite narrow in the eye region (Fig. 58). The height of the clypeus is less than the diameter of the anterior median eyes. The abdomen is ovoid, widest in the middle or in the posterior half and held at an angle of about 135° (Fig. 59). The legs are of intermediate length with many long macrosetae (Figs. 59, 118). The coloration and marks are diagnostic for many species.

The anterior median eyes may be slightly larger than the posterior medians, sometimes subequal, but in *M. calcarifera* they are a little smaller. The lateral eyes are between 0.7 and 0.9 diameters of the anterior median eyes in size.

The anterior median eyes are always separated by about their diameter and the same distance or slightly more from the anterior laterals, at most 1.5 diameters from the laterals in *M. maculata*, 1.4 in *M. passiva*. The posterior median eyes are also separated by about their diameter or slightly less, and by their diameter or two diameters at most from the posterior laterals. The secondary eyes have black rings and the posterior medians often have wide black rings.

*Grasshoff (personal communication) considers these genera, as well as his own *Prasonicella* and *Umbonata*, distinct because of the carapace shape and different arrangement of the feathered trichobothria on the third tibia. Grasshoff may be right and I may find it desirable to separate these genera when I study the neotropical *Mangora*.

Genitalia. The female epigynum may have a scape (Fig. 61) in temperate species but lacks a scape (Fig. 133) in many tropical American species. The epigynum is very lightly sclerotized in those with a scape. The posterior view of the epigynum and the internal genitalia, the shape of the seminal receptacles and the ducts, are diagnostic features that separate the species.

The male palpus is complex. It has a conductor, a small median apophysis with one or two points (Figs. 68, 80, 127), a complex and sometimes huge embolus (Figs. 68, 127), and a terminal apophysis. The terminal apophysis is on a large hematocha, and below the terminal apophysis is an odd sclerite which is difficult to homologize but is probably a subterminal apophysis. The palpal patella has only one macroseta. (There are two in *Araneus* and many araneid genera, three in *Araniella*.)

The males are only slightly smaller (1.9 to 4.0 mm) than females (2.3 to 5.5 mm), have the same shape, and similar pattern and eye distances. The first coxa in all species has a hook on the posterior distal margin, and there is a groove on the second femur; the legs are not otherwise modified, except sometimes by strong macrosetae on the second tibia.

Diagnosis. *Mangora* species can be separated from other araneid species by two very distinct characters: the carapace is very high in the thoracic region, sloping down gently toward the head region, more abruptly toward the posterior margin (Figs. 59, 94, 118), and the prolateral surface of the third tibia of both males and females has transverse rows of long, feathered trichobothria (Figs. 59, 64). Also the abdomen is attached to the cephalothorax at a peculiar angle.

Relationships. The type species for the name *Mangora* will be illustrated in the planned revision of the tropical American species. It is similar to *M. calcarifera* but has a short embolus supported by the conductor and short epigynal ducts. It is less

specialized than *M. calcarifera*. Palpal structure (Figs. 102–109) and function of the only European species, *Mangora acalypha*, have been studied in detail by Grasshoff (1973). Grasshoff indicated that the *Mangora* palpus lacks a conductor; but I believe Grasshoff's "Teg F" is the missing structure. The structure I consider the subterminal apophysis was called subterminal apophysis 1 by Grasshoff. The subterminal apophysis 2 of Grasshoff, I consider to be a part of the terminal apophysis (judging by the examination of the structure in a number of species).

There appear to be two species groups in America, the *M. acalypha* group with a scape in the epigynum, and the *M. picta* group without a scape (Figs. 131, 133). The *M. picta* group is better represented in tropical America but has only one species, *M. calcarifera*, that extends into the area under consideration here. *Mangora acalypha*, of the first group, has been studied in detail by Grasshoff, not only the structure but also the function of the palpus: the spine of the median apophysis hooks into the tip of the scape, as it does in other Araneidae and Linyphiidae examined. The paracymbium in the expanded palpus lies on the median apophysis, preventing it from turning and, in turn, is prevented from moving by the radix, under which it lies. The massive subterminal apophysis lies between tegulum and the base of the epigynum, opposed by the conductor, which presses on the side of the scape.

Mangora calcarifera, representing the *M. picta* group, has a very different palpus. The large subterminal apophysis present in the *M. acalypha* group (Fig. 129) cannot be found (Figs. 143, 144). The median apophysis has changed in position and is located behind what I believe to be the conductor. I believe the conductor to be the structure that grows out of the tegulum at the point at which the sperm duct makes its appearance on the side of the tegulum; coming from the embolus through the inside of the bulb and continuing below the

surface of the tegulum into the subtegulum. In *M. calcarifera*, the conductor is just a lobe. The terminal apophysis, as in the *M. acalypha* group, is a complex sclerite. The filament of the long embolus of *M. calcarifera* is held by the radix, an unusual feature characteristic of the species rather than the species group. The tip of the embolus usually lies against the conductor.

At present I think that the palpus of *M. calcarifera* is derived from a more complex palpus rather than being primitive. The palpus appears to have lost secondarily the subterminal apophysis, judging by the palpal complexity, and the epigynum has secondarily lost the scape. The conductor and median apophysis have lost their function and have (secondarily) become reduced. If the structure were primitively simple I would expect the conductor and median apophysis to be absent.

I have not studied the tropical species carefully. I have made drawings, but have not expanded the palpi to study their structure. But superficial examination indicates that *M. calcarifera* is an extreme form of a very diverse group and there are species intermediate between the *M. acalypha* group and *M. calcarifera*. The epigynal scape also shows intermediate forms, reduction to a fixed inflexible median extension of the base, to total disappearance.

Archer's work on *Mangora* (1951a) is confused and is difficult to follow. Archer, given specimens of a new species by Wilton Ivie, described them as *M. floridana*. But other specimens of this same species from Alabama he labeled correctly as *M. spiculata*. One of these is here designated a neotype of *Epeira spiculata*. However, in his publication (1951a), Archer pictured the species generally considered to be *M. placida* since the time of Emerton (1884, *Trans. Connecticut Acad. Sci.*, 6: 316), called it *spiculata*, and labeled the illustrations of his specimens of *M. spiculata* as *M. placida*. This is a departure from his mostly correct determinations and from all

previous usage, and will not be followed here.

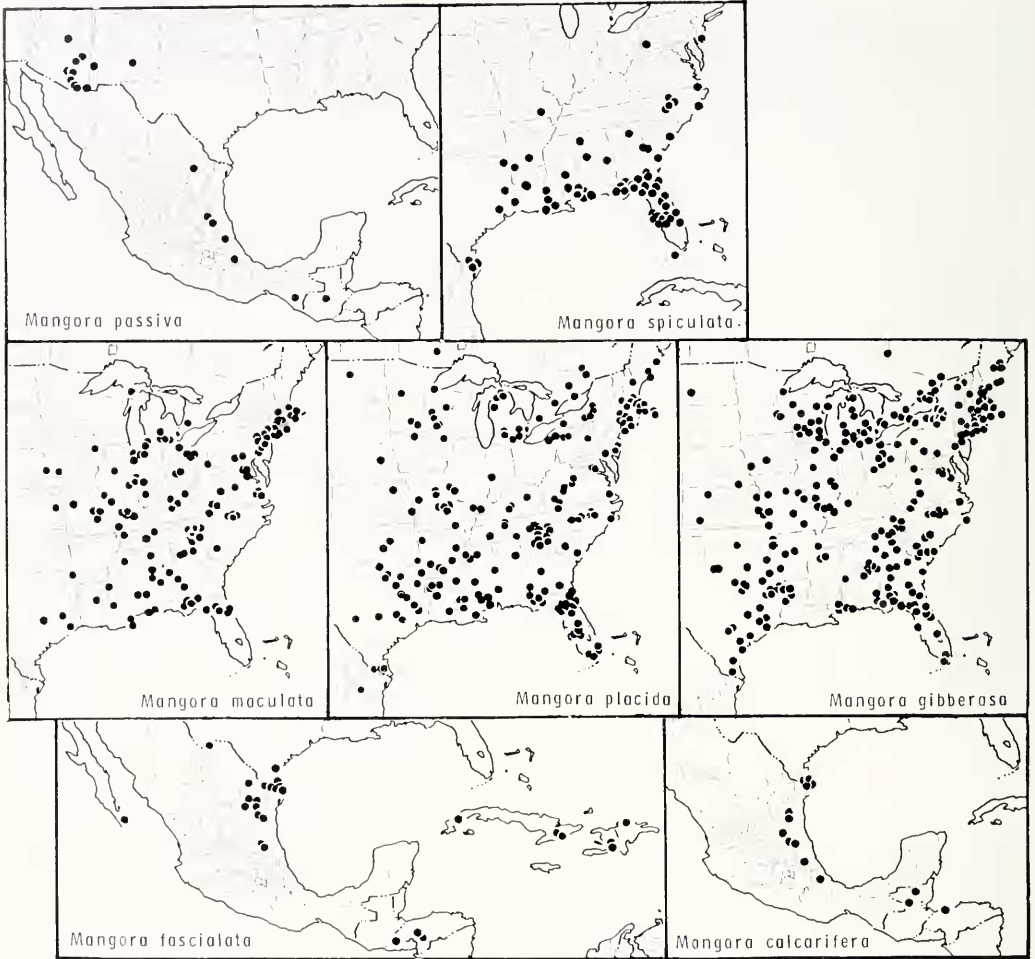
Natural History. The most common species in the eastern United States are *M. placida* and *M. maculata*, both common in the undergrowth of woods, *M. maculata* being mature in summer, *M. placida* in spring. *Mangora gibberosa* is more common in fields and meadows and is mature from early to late summer. But forest species may be found in fields and *M. gibberosa* sometimes in woods.

The orb-web of *Mangora* species is vertical to horizontal, very finely meshed and has many closely spaced threads. *Mangora gibberosa* has 50 to 60 radii (Kaston, 1948) and more than 50 viscid threads in the lower half (Plate 2). *Mangora acalypha* of Europe also has 50 to 60 radii and 50 to 60 viscous threads. The hub in the center has 10 to 12 turns and there is a free zone between it and the viscous threads (Wichle, 1931). Wichle observed the laying of the scaffolding threads: 10 turns with 510 attachments, finished in seven minutes. The web is probably replaced every morning, judging by its perfect condition in the early hours. There is no retreat. The spider hangs in the hub and when disturbed runs to a grass blade on the side or drops on a thread (Plate 2).

Distribution. Although there is one European species, several species have been described from Africa, and several from eastern Asia; most species are American. Of the perhaps 30 to 50 American species, only seven are found north of Mexico. One of these, *M. passiva*, is found in the southwest to Central America; all others are eastern. Only *M. placida*, *M. maculata*, and *M. gibberosa* are found in southern Canada, and *M. calcarifera* and *M. fasciata* are found only in southern Texas. The range of *M. calcarifera* extends to Central America, that of *M. fasciata* to Baja California, Central America (Map 4) and the West Indies (Map 4). The many tropical species of *Mangora* are more diverse, some



Plate 2. *Mangora gibberosa*, female, in field in Massachusetts with morning dew.



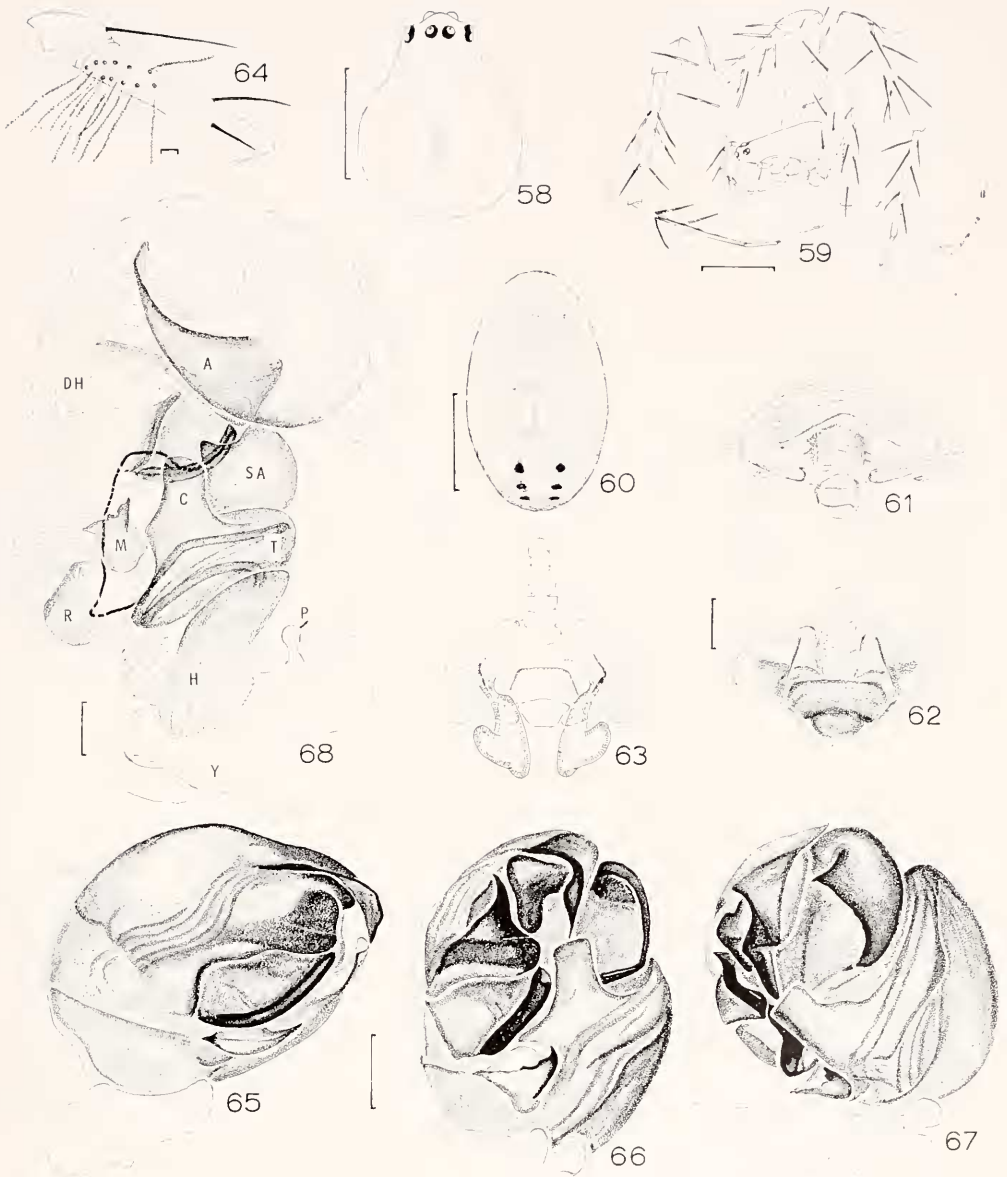
Map 4. Distribution of the species of *Mangora* occurring north of Mexico.

smaller, others larger, than the few species of the temperate region.

KEY TO SPECIES OF *MANGORA* NORTH OF MEXICO

- 1 A black longitudinal line on venters of femora one and two (Fig. 118); dorsum of abdomen with 2-3 lines (Figs. 110, 119).
- No black longitudinal line on venters of first and second femora; abdomen marked with spots or patches. 2
- 2(1) Epigynum longer than wide in posterior view (Fig. 121); palpus with a long biforked embolus in mesal view (Figs. 125, 127); eastern United States
- *gibberosa*

- Epigynum wider than long (Fig. 112); palpus not with biforked embolus, but two branches very short (Figs. 116, 117); southern Texas. *fasciata*
- 3(1) Posterior median eyes larger than anterior medians; epigynum without scape but with median depression (Figs. 131, 133); palpus with long filiform embolus and terminal apophysis projecting in direction opposite to that of base of embolus (Figs. 140-144); southern Texas to Guatemala. *calcarifera*
- Posterior median eyes subequal or smaller than anterior medians; epigynum with scape (Figs. 61, 69, 90); embolus short, terminal apophysis not projecting opposite base of embolus. 4



Figures 58-68. *Mangora maculata* (Keyserling). 58-64. Female; 58. Carapace, 59. Lateral view, 60. Abdomen, dorsal. 61-63. Epigynum; 61. Ventral, 62. Posterior, 63. Posterior cleared. 64. Female left third patella and tibia, prolateral. 65-68. Left palpus; 65. Mesal, 66. Ventral, 67. Ventro-lateral, 68. Expanded.

Abbreviations. A, terminal apophysis; C, conductor; DH, distal hematodocha; E, embolus; H, basal hematodocha; M, median apophysis; P, paracymbium; R, radix; SA, subterminal apophysis; T, tegulum; Y, cymbium.

Size indicators: 0.1 mm, except 58, 59, 60, 1.0 mm.

- 4(3) Spinnerets black, contrasting with light venter of abdomen; dorsum of abdomen with two inverted white comma-shaped marks (Figs. 75, 76); male terminal apophysis bent distally at tip (Fig. 79); epigynum as in Figs. 69-74; Arizona, New Mexico to Guatemala. ----- *passiva*
- Spinnerets not darker than venter of abdomen; dorsal abdominal marks otherwise; eastern United States and Canada. 5
- 5(4) Carapace without black median longitudinal line (Fig. 58); abdomen with three pairs of black spots posteriorly (Fig. 60); epigynum in posterior view with transverse sclerotized piece (Fig. 62); seminal receptacles not spherical (Fig. 63); palpus with terminal apophysis overhanging and almost touching conductor and embolus (Figs. 65-67). ----- *maculata*
- Carapace with median black longitudinal stripe (Fig. 96); abdomen marked with more anterior spots (Figs. 87, 95); epigynum and palpus otherwise. ----- 6
- 6(5) Area between posterior abdominal spots black (Fig. 95); epigynum with a transverse sclerite on each side of scape (Fig. 90); median apophysis with only one spine (Figs. 100, 101); subterminal apophysis triangular with a thorn at base of conductor (Fig. 101); eastern U. S. ----- *placida*
- Area between posterior black abdominal spots gray (Fig. 87); epigynum with a longitudinal sclerite some distance from scape (Fig. 82); median apophysis with two spines (Figs. 88, 89); subterminal apophysis recessed between upper and lower lip (Fig. 89); Gulf States. ----- *spiculata*

Mangora maculata (Keyserling)

Figures 58-68; Map 4

Epeira maculata Keyserling, 1865, Verhandl. Zool. Bot. Ges. Wien, 15: 827, pl. 18, figs. 24-27, ♀, ♂. Female lectotypes here designated and one female paralectotype from Baltimore in the British Museum (Natural History). Six female and one male paralectotypes are *Metazygia incerta* (O. P.-Cambridge). Keyserling, 1893, Spinnen Amerikas, 4: 242, pl. 12, fig. 181, ♀, ♂.

Abbotia maculata, - McCook, 1893, American Spiders, 3: 241, pl. 20, figs. 9, 10, ♀, ♂.

Mangora maculata, - Comstock, 1912, Spider Book, p. 507. Comstock, 1910, Spider Book, rev. ed., p. 520. Roewer, 1942, Katalog der Araneae, 1: 775. Kaston, 1948, Bull. Connecti-

cut Geol. Natur. Hist. Surv., 70: 239, fig. 757, ♀. Bonnet, 1955, Bibliographia Araneorum, 2: 2709. Grasshoff, 1971, Senckenbergiana Biol., 52: 295, fig. 48, ♂.

Mangora ornata, - Chamberlin and Ivie, 1944, Bull. Univ. Utah, Biol. Ser. 8(5): 105, fig. 8.

Note. *Theridion ornatum* is an old name that Chamberlin and Ivie (1944) attempted to resurrect for this species of *Mangora*. *Theridion ornatum* Walckenaer cannot be applied to this species. It is also a junior homonym of *T. ornatum* Hahn and was replaced by Roewer (1942) with *T. ornatum*. The Abbot drawing, Walckenaer's type of *T. ornatum*, has a different abdominal pattern.

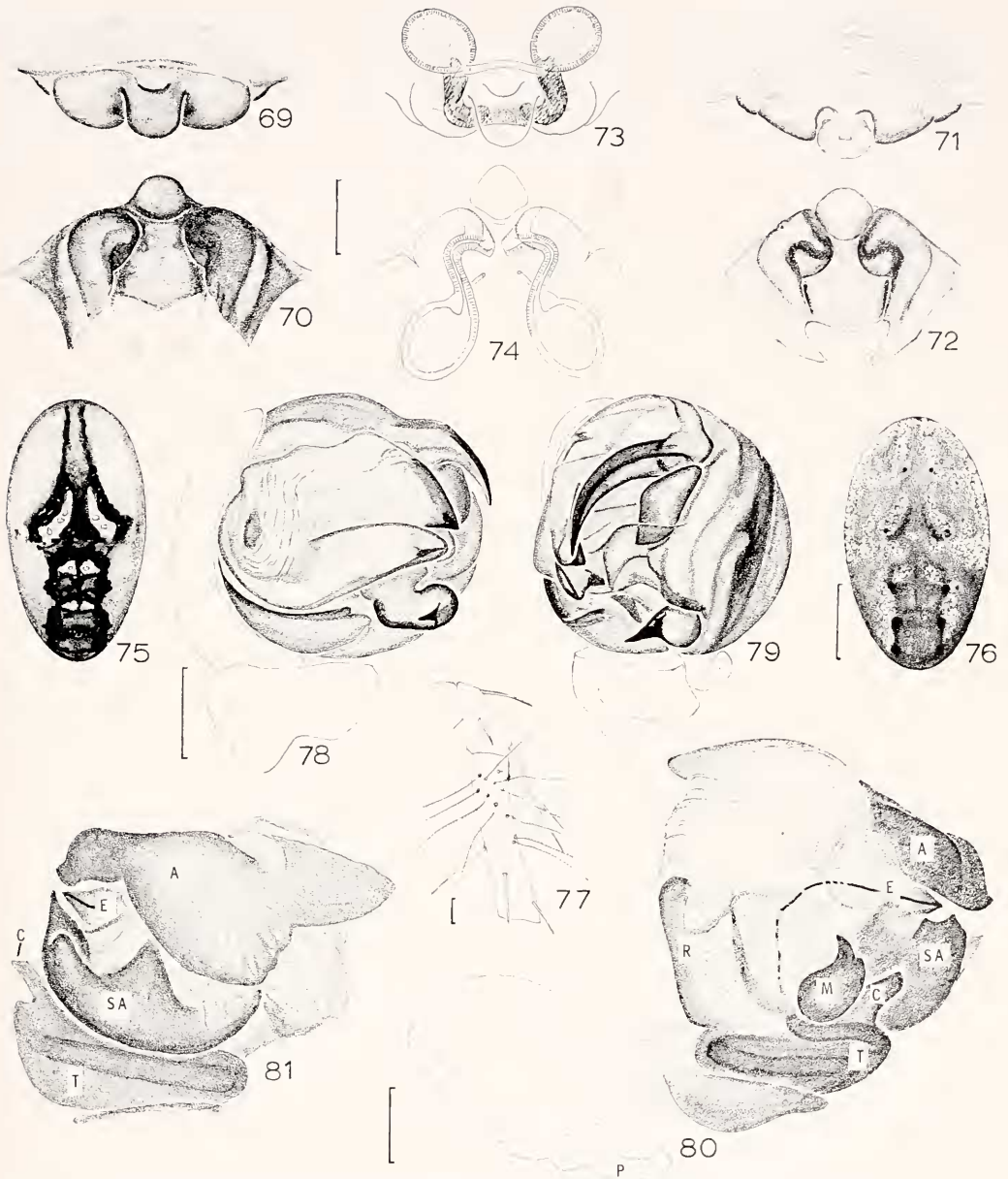
In collections many specimens are erroneously labeled *M. gibberosa*.

Description. Female from New Jersey: carapace, sternum, legs yellow-white. Dorsum and sides of abdomen with many white spots. There are three pairs of black patches posteriorly on the dorsum of the abdomen (Fig. 60). The venter has fewer white spots than the dorsum. The lateral eyes are 0.7 diameter of the medians, which are subequal in size. The anterior median eyes are one diameter apart, 1.5 from laterals. The posterior median eyes are slightly less than their diameter apart, 1.5 diameters from laterals. Total length 3.6 mm. Carapace 1.8 mm long, 1.4 mm wide. First femur, 2.3 mm; patella and tibia, 2.7 mm; metatarsus, 2.1 mm; tarsus, 1.0 mm. Second patella and tibia, 2.0 mm; third, 1.4 mm; fourth, 2.1 mm.

Male from New Jersey: coloration and eyes as in female. Total length 3.0 mm. Carapace 1.7 mm long, 1.3 mm wide. First femur, 2.1 mm; patella and tibia, 2.4 mm; metatarsus, 2.1 mm; tarsus, 1.0 mm. Second patella and tibia, 2.0 mm; third, 1.2 mm; fourth, 2.0 mm.

Variation. Females varied in total length from 3.6 to 5.5 mm; carapace 1.6 to 2.2 mm long, 1.3 to 1.7 mm wide. Males varied in total length from 2.7 to 4.0 mm; carapace 1.4 to 2.0 mm long, 1.2 to 1.6 mm wide.

Diagnosis. This common species lacks a median black line on the carapace (Fig.



Figures 69-79. *Mangora passiva* (O.P.-Cambridge). 69-74. Epigynum; 69, 71, 73. Ventral, 70, 72, 74. Posterior, 73, 74. Cleared. 69, 70, 73: (Syntype from Guatemala). 71, 72, 74: (Arizona). 75, 76. Female abdomen, dorsal; 75: (Guatemala). 76: (Arizona). 77: Female left third patella and tibia, prolatateral. 78, 79. Left male palpus; 78. Mesal, 79. Ventral.

Figures 80-81. *Mangora placida* (Hentz), Left male palpus expanded; 80. Bulb, submesal view, 81. Bulb, lateral view.

Abbreviations. A, terminal apophysis; C, conductor; E, embolus; M, median apophysis; P, paracymbium; R, radix; SA, subterminal apophysis; T, tegulum.

Size indicators: 0.1 mm, except 75, 76, 1.0 mm.

58) and there are three pairs of black spots on the posterior part of the abdomen (Fig. 60). The epigynum in posterior view has a transverse sclerite (Fig. 62), the terminal apophysis of the palpus overhangs and almost touches embolus and conductor (Fig. 65).

Natural History. *Mangora maculata* has been collected in: a bog in Ontario, deciduous forest in Kansas, woods and shrubs and beech-maple dunes in Illinois, xero-mesic woods and edge of woods around fern-sedge-sumac swamp in Michigan, mesic woods in Virginia, flood plain forest in Tennessee, pine-hardwood bottom land in North Carolina, a ravine of a river in Georgia, flood plain hardwood forest in Louisiana. In Florida it has been found in tall grass and low brush, in dense woods, and in cypress on shore. Berry (1971, Amer. Midl. Natur. 85: 528) reports that immatures can be found most abundantly in June and July, adults from June and July until October in North Carolina.

Distribution. Eastern North America from Massachusetts, southern Ontario, northern Michigan to eastern Kansas, eastern Texas and northern Florida (Map 4).

Mangora passiva (O.P.-Cambridge)

Figures 69-79; Map 4

Epeira passiva O. P.-Cambridge, 1889. *Biologia Centrali-Americana, Araneidea*, 1: 20, pl. 5, fig. 4, ♀. Female syntypes from Cahabón [Alto Verapaz], San Juan [? Alto Verapaz], Chaneleco [?], Tactic [Alto Verapaz], Chichochoe [?], Laguna de los Coheteros [?], Cobán [Alto Verapaz], all Guatemala in the British Museum (Natural History), examined.

Mangora passiva, - F. P.-Cambridge, 1904. *Biologia Centrali-Americana, Araneidea*, 2: 480, pl. 45, fig. 19, ♀. Roewer, 1942, *Katalog der Araneae*, 1: 774. Bonnet, 1955, *Bibliographia Araneorum*, 2: 2710.

Description. Female from Arizona: carapace with median longitudinal black line, eyes on black spot. Legs yellow, not banded, but with some dark spots at ends of articles. Dorsum of abdomen with a distinct pattern of upside-down comma-shaped marks (Figs. 75, 76). Sides below

white band lacking pigment; a white pigment band on each side below pigmentless area. Venter with median longitudinal white spot and two pairs of white spots on each side of spinnerets. Spinnerets black. Posterior median eyes subequal to anterior medians, laterals about 0.9 diameter of anterior median eyes. Anterior median eyes their diameter apart, 1.4 diameters from laterals; posterior medians their diameter apart, slightly less than two from laterals. Total length 4.1 mm. Carapace 1.7 mm long, 1.5 mm wide. First femur, 2.0 mm; patella and tibia, 2.0 mm; metatarsus, 1.8 mm; tarsus, 0.7 mm. Second patella and tibia, 2.0 mm; third, 1.3 mm; fourth, 2.0 mm.

Male from Arizona: coloration of carapace as in female. Posterior half of dorsum of abdomen with three pairs of black spots, second and third pairs fused into longitudinal lines. There is a band of dorsal white pigment spots on each side. Venter without pigment, but spinnerets black. Secondary eyes 0.8 diameter of anterior medians. Anterior median eyes slightly less than one diameter apart, the same distance from laterals. Posterior median eyes their diameter apart, 1.5 diameters from laterals. Total length 2.3 mm. Carapace 1.3 mm long, 1.1 mm wide. First femur, 1.7 mm; patella and tibia, 1.7 mm; metatarsus, 1.6 mm; tarsus, 0.6 mm. Second patella and tibia, 1.5 mm; third, 1.0 mm; fourth, 1.4 mm.

Variation. Females vary in total length from 3.6 to 5.5 mm, carapace 1.7 to 2.0 mm long, 1.3 to 1.7 mm wide; males, total length 2.2 to 2.7 mm, carapace 1.3 to 1.5 mm long, 1.1 to 1.6 mm wide. Northern specimens are much lighter in color with only little black pigment (Fig. 76); specimens from central Mexico to Guatemala have a lot of black pigment on the dorsum of the abdomen, and the venter may have a median longitudinal white spot. There are also differences in the epigynum; it is less sclerotized in northern specimens with some wrinkles on the surface (Fig. 71),

smoother and more sclerotized in southern specimens (Fig. 69). Southern specimens appear to have the connecting ducts (Fig. 74) shorter and less looped than northern specimens. The measurements of a syntype from Cahabón are almost the same as those of the Arizona specimen.

Diagnosis. *Mangora passiva* can be separated from related species by the two inverted comma-shaped white marks on the dorsum of the abdomen (Figs. 75, 76). In the southwestern United States they can readily be separated by the light venter with contrasting black spinnerets. The epigynum in posterior view has diagnostic semicircular lips (Figs. 70, 72), and has large pear-shaped seminal receptacles (Fig. 74). The sickle-shaped terminal apophysis of the palpus (Figs. 78, 79) separates males of *M. passiva* from those of other species in the northern part of the range; the large subterminal apophysis (Fig. 79) separates *M. passiva* from the similar *Mangora bimaculata* (O. P.-Cambridge), in which this sclerite is very small.

Natural History. *Mangora passiva* has been collected by sweeping shrubs in oak-yellow pine woods, and from web in *Cornus* sp. near stream of the Santa Catalina Mts., Arizona, 1500–2300 m elevation.

Distribution. Arizona and New Mexico to Guatemala (Map 4).

Mangora spiculata (Hentz)

Figures 82–89; Map 4

Epeira spiculata Hentz, 1847, J. Boston Soc. Natur. Hist., 5: 475, pl. 31, fig. 13, ♀. Female type from woods, Alabama, destroyed. Female neotype here designated from hammock woods, Dixie Graves Parkway, Baldwin County, Alabama, 10 March 1949 (A. F. Archer) in the American Museum of Natural History.

Mangora floridana Archer, 1951, Amer. Mus. Novitates, 1487: 14, figs. 31, 56, 60, ♀, ♂. Three male, one female syntypes from Peace River, west of Arcadia, Florida in the American Museum of Natural History, examined. NEW SYNONYMY.

Mangora spiculata, – Archer, 1951, Amer. Mus. Novitates, 1487: 46, fig. 27, ♀.

Mangora placida, – Archer, 1951, Amer. Mus. Novitates, 1487: 46, fig. 30, ♂.

Note. Ivie recognized this species as distinct and gave Archer his illustrations (Archer, 1951, figs. 56, 60), which Archer used, though he failed to recognize the diagnostic features of the species. Specimens determined by Archer as *floridana* are almost all *M. placida* (Hentz). Archer correctly determined specimens of this species *spiculata*, but wrote (1951) that the median apophysis has a single apical spur (a character of *M. placida*). I will follow Archer's determinations for the sake of stability of names, and have used as neotype of *Epeira spiculata* Hentz a specimen determined by Archer as *M. spiculata*. The name *Mangora placida* has been used continuously since the 1880's for a different, more common species having a wider range.

In various collections, most specimens of this species had been misidentified as *M. placida*.

Description. Female paratype of *M. floridana*: carapace yellowish; posterior median eyes with black eye rings and a median longitudinal dusky line, which is wider anteriorly. Thoracic area with a dusky margin on each side. Sternum yellowish with grayish on each side. Legs yellowish. Dorsum of abdomen with white pigment and posteriorly four pairs of round black spots; area between spots gray. Anteriorly there is a longitudinal line crossed by a transverse line without pigment (Fig. 87). Venter with a pair of longitudinal lines of white spots. Posterior median eyes 0.9 diameter of anterior medians. Anterior laterals 0.7, posterior laterals 0.8 diameter of anterior median eyes. Anterior median eyes their diameter apart, slightly less than one diameter from laterals. Posterior median eyes are one diameter apart, slightly more than one from laterals. Total length 2.4 mm. Carapace 1.13 mm long, 1.03 mm wide, 0.41 mm high. First femur, 1.41 mm; patella and tibia, 1.60 mm; metatarsus, 1.30 mm; tarsus, 0.59 mm. Second patella and tibia, 1.43 mm; third, 0.82 mm; fourth, 1.33 mm.

Male syntype of *M. floridana*: coloration

and structure as in female. Total length 1.9 mm. Carapace 1.13 mm long, 0.93 mm wide. First femur, 1.22 mm; patella and tibia, 1.38 mm; metatarsus, 1.08 mm; tarsus, 0.60 mm. Second patella and tibia, 1.18 mm; third, 0.67 mm; fourth, 0.96 mm.

Variation. Females varied in total length from 2.4 to 4.3 mm, carapace 1.1 to 1.7 mm long, 0.9 to 1.3 mm wide. Males varied in total length from 1.9 to 2.2 mm, carapace 1.1 to 1.2 mm long.

Diagnosis. The epigynum of *M. spiculata* differs from that of *M. passiva* in having a sclerotized piece on each side of the base in longitudinal direction (Figs. 82, 84), and the epigynum differs in posterior view in having the median soft area relatively larger (Fig. 83) than in *M. passiva*. The palpus of *M. spiculata* has a median apophysis with two points (Figs. 88, 89) and the subtegular apophysis lateral to the conductor has a recessed area (Fig. 89), while *M. placida* has only one point on the median apophysis and sclerotized piece lateral of the conductor is triangular with a thorn directed toward the base of the conductor.

Natural History. *Mangora spiculata* has been found in oak, pine hammock woods, in Alabama, low weeds and grass in Mississippi and tall grass, low brush and in dense undergrowth of wire grass in high pine-turkey oak woods in northern Florida. Males are mature in May in New Jersey, in June in Texas and North Carolina, January to July in Florida.

Distribution. Southeastern United States from New Jersey, Pennsylvania, southern Missouri to southern Texas; most common in northern Florida (Map 4); the northernmost record is from seven miles northwest

of Gretna, Bass River State Forest, New Jersey; males and females, May, 1949.

Mangora placida (Hentz)

Figures 80, 81, 90–101; Map 4

Epeira placida Hentz, 1847, J. Boston Soc. Natur. Hist., 5: 475, pl. 31, fig. 12, ♀. Female type from Alabama, destroyed. Emerton, 1884, Trans. Connecticut Acad. Sci., 6: 316, pl. 34, fig. 2, pl. 36, figs. 10, 13, ♀, ♂. McCook, 1893, Amer. Spiders, 3: 153, pl. 4, figs. 4, 5, ♀, ♂. Emerton, 1902, Common Spiders, 176, fig. 414.

Epeira practrepida Keyserling, 1880, Verhandl. Zool. Bot. Ges. Wien, 30: 549, pl. 16, fig. 2, ♀. Female holotype from Georgia, in the Muséum National d'Histoire Naturelle, Paris, examined. Keyserling, 1893, Spinnen Amerikas, 4: 232, pl. 11, fig. 173, ♀.

Mangora placida, – Comstock, 1912, Spider Book, p. 505, fig. 544, ♀. Comstock, 1940, Spider Book, rev. ed., p. 518, fig. 544, ♀. Roewer, 1942, Katalog der Araneae, 1: 775. Kaston, 1948, Bull. Connecticut Geol. Natur. Hist. Surv., 70: 238, figs. 753–754, ♀, ♂. Archer, 1951, Amer. Mus. Novitates, no. 1487: 46, fig. 29, ♀. Bonnet, 1955, Bibliographia Araneorum, 2: 2710.

Mangora spiculata, – Archer, 1951, Amer. Mus. Novitates, no. 1487: 46, fig. 28, ♂. Misidentified, not *M. spiculata* (Hentz).

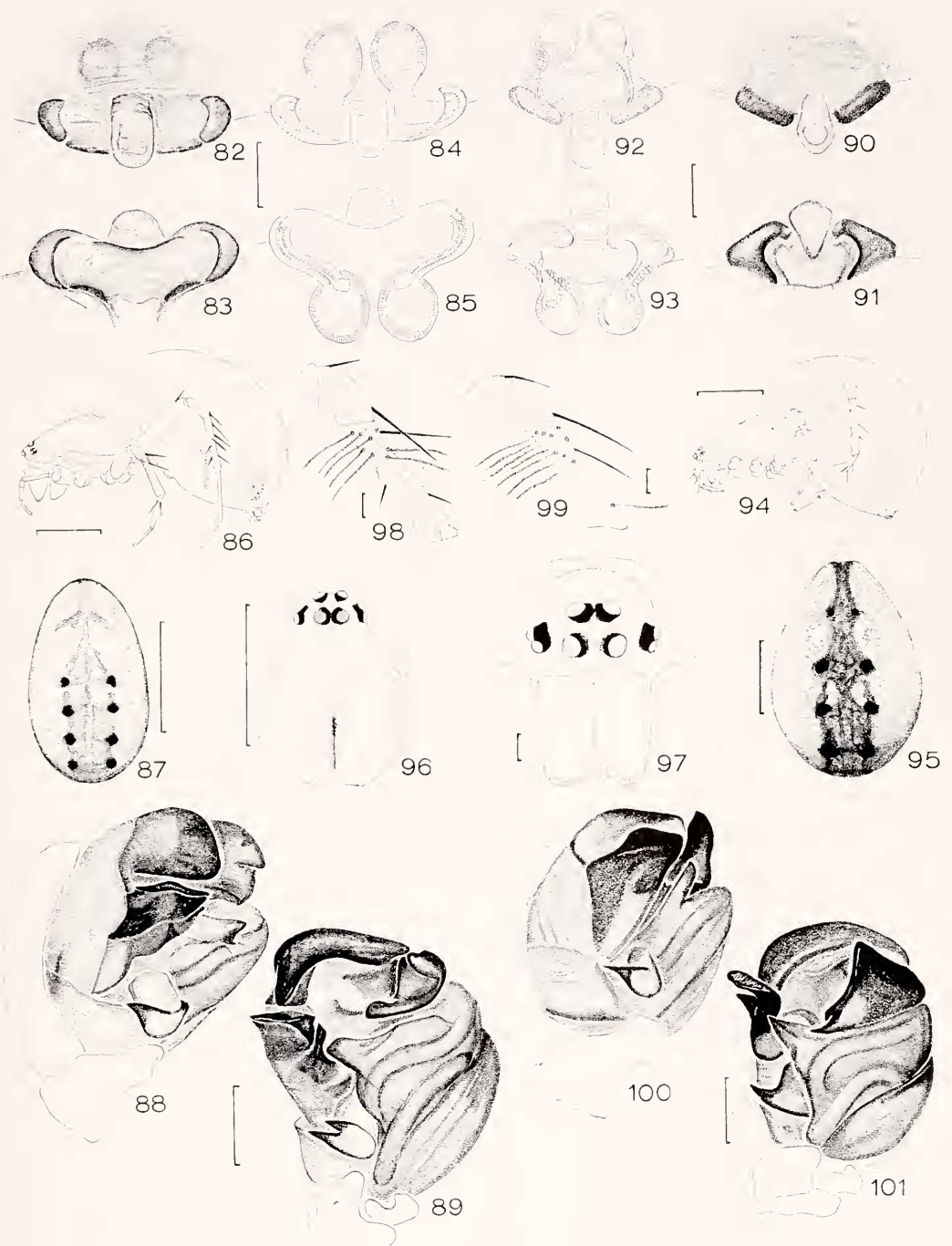
Note. I am not sure that this is the species Hentz illustrated, but this species has been called *M. placida* since 1884. The name *Mangora placida* has also been applied to specimens of *M. spiculata* in collections.

Description. Female from Michigan: carapace light brown, with a median dark line spreading out in eye area and becoming gray. Eyes ringed by black. Sternum light brown, dark around border. Legs light brown, with indications of bands and a light longitudinal gray line on venter. Dorsum of abdomen white with a median

Figures 82–89. *Mangora spiculata* (Hentz). 82–85. Epigynum; 82, 84. Ventral, 83, 85. Posterior, 84, 85. Cleared. 86. Female. 87. Female abdomen, dorsal. 88–89. Left male palpus; 88. Mesal, 89. Ventral.

Figures 90–101. *Mangora placida* (Hentz). 90–93. Epigynum; 90, 92. Ventral, 91, 93. Posterior, 92, 93. Cleared. 94. Female. 95. Female abdomen, dorsal. 96. Female carapace. 97. Eye area and chelicerae. 98, 99. Left third patella and tibia, prolateral; 98. Female, 99. Male. 100–101. Male palpus; 100. Mesal, 101. Ventral.

Size indicators: 0.1 mm, except 86, 87, 94, 95, 96, 0.1 mm.



dark line. The line is narrow in front, widest posteriorly, enclosing three pairs of black spots (Fig. 95). Sides white but black near spinnerets. Venter black in center with white on each side. The lateral eyes are slightly smaller than the medians. Anterior median eyes one diameter apart, one from laterals. Posterior median eyes slightly less than one diameter apart, one and one-quarter from laterals. Total length 3.6 mm. Carapace 1.4 mm long, 1.1 mm wide. First femur, 1.6 mm; patella and tibia, 1.6 mm; metatarsus, 1.2 mm; tarsus, 0.7 mm. Second patella and tibia, 1.5 mm; third, 0.9 mm; fourth, 1.4 mm.

Male: coloration like that of female except more contrasting and carapace darker. Eye arrangement like that of female. Total length 2.3 mm. Carapace 1.3 mm long, 1.0 mm wide. First femur, 1.3 mm; patella and tibia, 1.6 mm; metatarsus, 1.1 mm; tarsus, 0.7 mm. Second patella and tibia, 1.4 mm; third, 0.8 mm; fourth, 0.9 mm.

Variation. Females vary in total length from 2.3 to 4.5 mm, carapace 1.1 to 1.7 mm long, 0.9 to 1.3 wide. Males vary in total length from 2.0 to 2.8 mm, carapace 1.0 to 1.4 mm long, 0.8 to 1.1 mm wide.

Diagnosis. Unlike *M. spiculata*, the base of epigynum of *M. passiva* has two transverse, posterior sclerotized pieces (Fig. 90) and in posterior view the median soft area is smaller (Fig. 91) than that of *M. spiculata*. The palpus differs from that of *M. spiculata* in having a median apophysis with one point (Figs. 100–101) and a triangular sclerotized piece lateral to the conductor. The triangular piece has a thorn at the base pointing toward the conductor (Fig. 101). In *M. spiculata* this sclerite has a notch.

Natural History. *Mangora placida* has been collected from tree plantings in a sand dune area of North Dakota; from herb layer of deciduous forest in northern Wisconsin, New England, Virginia, and Texas; vero-mesic woods and woods around swamp in Michigan; mesic hammock, mixed forest to very dry woods in Florida. Males are

mature from May to June in New England, May in New Jersey, November to February in Florida. Adult females can be found from May through the summer in northern states, in all seasons in Florida. Berry (1971, *Amer. Midland Natur.* 85: 528) reports that the species matures from March to May in North Carolina, earlier than *M. gibberosa* and *M. maculata*, but he probably confused two species under the name.

Distribution. Eastern United States, Maine and Ontario to North Dakota, southern Florida, southern Texas, northeastern Mexico. The southernmost locality is Linares, Nuevo León.

Mangora fascialata Franganillo Figures 110–117

Mangora fascialata Franganillo, 1936, *Los Aracidos de Cuba*, p. 83. Franganillo specimens from Cuba in Cuban Academy of Science, Havana, lack labels. Bonnet, 1956, *Bibliographia Araneorum*, 2: 2708.

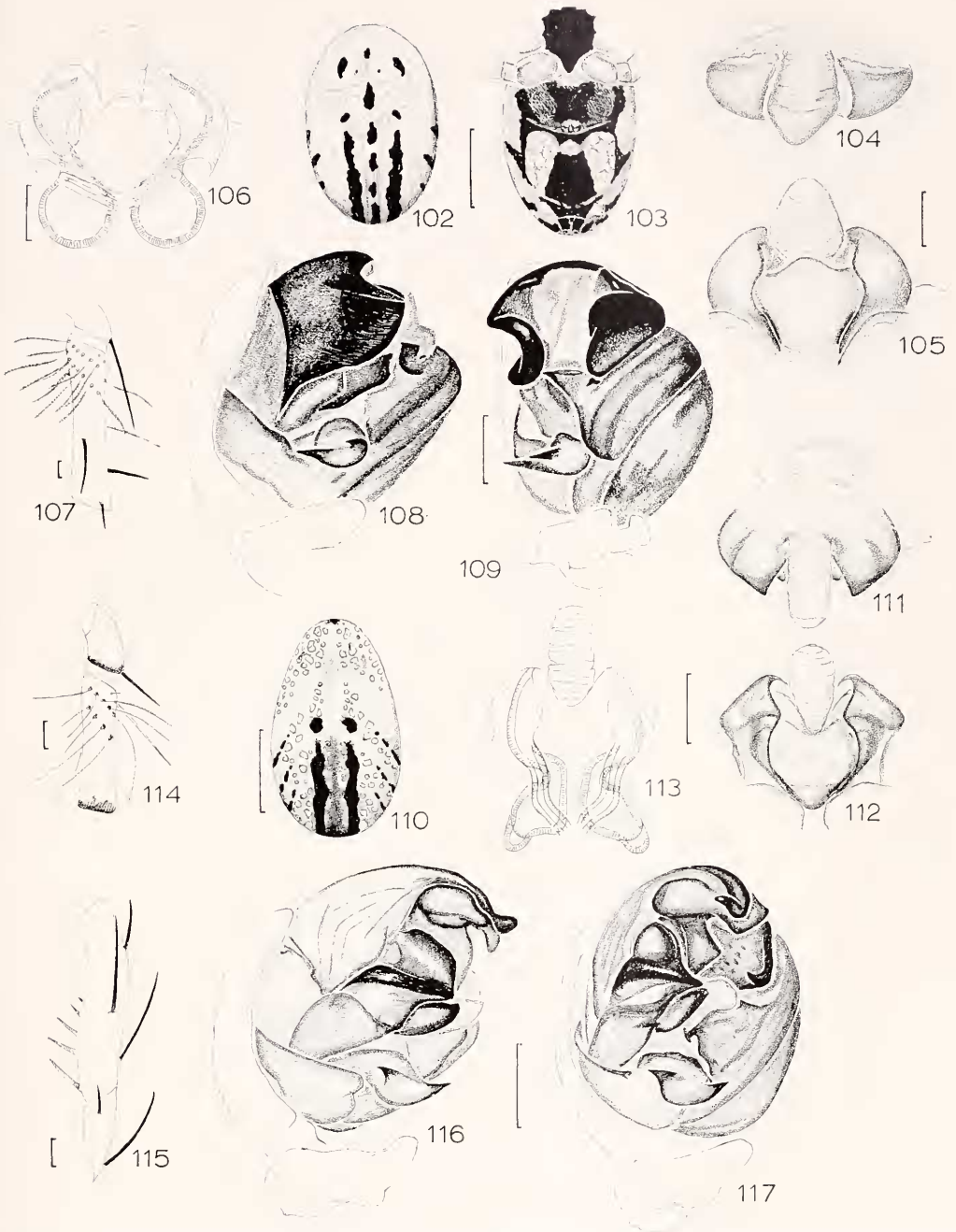
Mangora striatipes Bryant, 1945, *Bull. Mus. Comp. Zool.*, 95: 375, figs. 17, 18, ♀, ♂. Male holotype from Puerto Plata, Dominican Republic, in the Museum of Comparative Zoology, examined. NEW SYNONYMY.

Mangora gibberosa, – Kraus, 1955, *Abhandl. Senckenberg. Naturf. Gesell.* 493: 22, figs. 57, 58, ♀. Not *M. gibberosa* (Hentz).

Mangora conspicua Chickering, 1963, *Breviora*, *Mus. Comp. Zool.*, 191: 2, figs. 1–7, ♀, ♂. Female holotype from El Potosí, Cerro Potosí, Nuevo León, Mexico in the Museum of Comparative Zoology, examined. NEW SYNONYMY.

Note. Franganillo lists three species of *Mangora* for Cuba; but only one species is in North American collections; there is no evidence that either *M. placida* or *M. picta* occurs on the island. Even if they do, *M. fascialata* is the most common species. Franganillo compares *M. fascialata* with *M. acalypha*, further evidence that this species was the subject of his poor description, lacking both illustration and labeled type.

Description. Female from Edinburg, Texas: carapace yellow-white with a median longitudinal black line, a black line around margin of thorax on each side, eyes



Figures 102-109. *Mangora acalypha* (Walckenaer) of Europe. 102. Female abdomen, dorsal. 103. Female abdomen and sternum, ventral. 104-106. Epigynum; 104. Ventral, 105, 106. Posterior, 106. Cleared. 107. Female left third tibia, prolateral. 108, 109. Left male palpus; 108. Mesal, 109. Ventral.

Figures 110-117. *Mangora fasciata* Franganillo. 110. Female abdomen, dorsal. 111-113. Epigynum; 111. Ventral, 112, 113. Posterior, 113. Cleared. 114. Female left third patella and tibia, prolateral. 115. Male left second tibia, prolateral. 116, 117. Male palpus; 116. Mesal, 117. Ventral.

Size indicators: 0.1 mm, except 102, 103, 110, 1.0 mm.

ringed by black. Sternum black, yellow in middle. Legs with black longitudinal ventral line on first and second femurs, and black spots and narrow rings on other articles. Posteriorly, dorsum of abdomen has a pair of longitudinal black lines (Fig. 110), with dark between lines; anteriorly there is a small median black spot. Dark areas are surrounded by white pigment spots. Sides have anterior black patches, and posterior dorsal lines go toward sides anteriorly. Venter black between epigynum and spinnerets, with a longitudinal white pigment line on each side. There is a transverse black line in front of spinnerets. The posterior spinnerets are black on the sides and the anal tubercle is black posteriorly. Diameter of posterior median eyes 1.1 diameters of anterior medians, laterals about 0.9 diameter of anterior medians. Anterior median eyes slightly more than their diameter apart, the same distance from laterals. Posterior median eyes their diameter apart, 1.7 diameters from laterals. Total length 3.6 mm. Carapace 1.4 mm long, 1.0 mm wide, 0.5 mm high. First femur, 1.5 mm; patella and tibia, 1.6 mm; metatarsus, 1.4 mm; tarsus, 0.7 mm. Second patella and tibia, 1.4 mm; third, 0.8 mm; fourth, 1.4 mm.

Male from Texas: coloration as in female, but venter of abdomen without black or white pigment. Diameter of posterior median eyes 0.8 diameter of anterior medians, anterior laterals 0.6, posterior laterals 0.5 diameter of anterior median eyes. Anterior median eyes 0.6 diameter apart, 0.6 diameter from laterals. Posterior median eyes 0.7 diameter apart, 1.5 diameters from laterals. The second tibia is slightly curved and has a row of five macrosetae, proximally toward the inside (Fig. 115). Total length 2.0 mm. Carapace 1.2 mm long, 0.9 mm wide, 0.5 mm high. First femur, 1.4 mm; patella and tibia, 1.4 mm; metatarsus, 1.1 mm; tarsus, 0.6 mm. Second patella and tibia, 1.1 mm; third, 0.7 mm; fourth, 1.1 mm.

Variation. Females varied in total length

from 3.2 to 3.6 mm. Carapace 1.3 to 1.6 mm long, 1.0 to 1.2 mm wide.

Diagnosis. As in *M. gibberosa*, but unlike other species, there are lines on the venter of the first two pairs of femora. *Mangora fascialata* differs from *M. gibberosa* by not having the long biforked embolus in the male palpus (Figs. 116–117), and by having the epigynum in posterior view about square (Fig. 112). The seminal receptacles have a lobe (Fig. 113). Those of *M. gibberosa* are oval. The diagnostic features are the median area of the epigynum whose outline is bottle-shaped in posterior view (Fig. 112), and the distal curl of the terminal apophysis of the palpus (Figs. 116, 117).

Natural History. The species has been collected from herbs and shrubs of live oak thicket, in cane and mesquite along river in southern Texas, by sweeping from weeds and acacia near road in Nuevo León. Females have been collected from April to December, males in June, July and November.

Distribution. Southern Texas, Baja California to El Salvador and Honduras, Hispaniola and Cuba. It has not been found in southern Florida although it may occur there (Map 4).

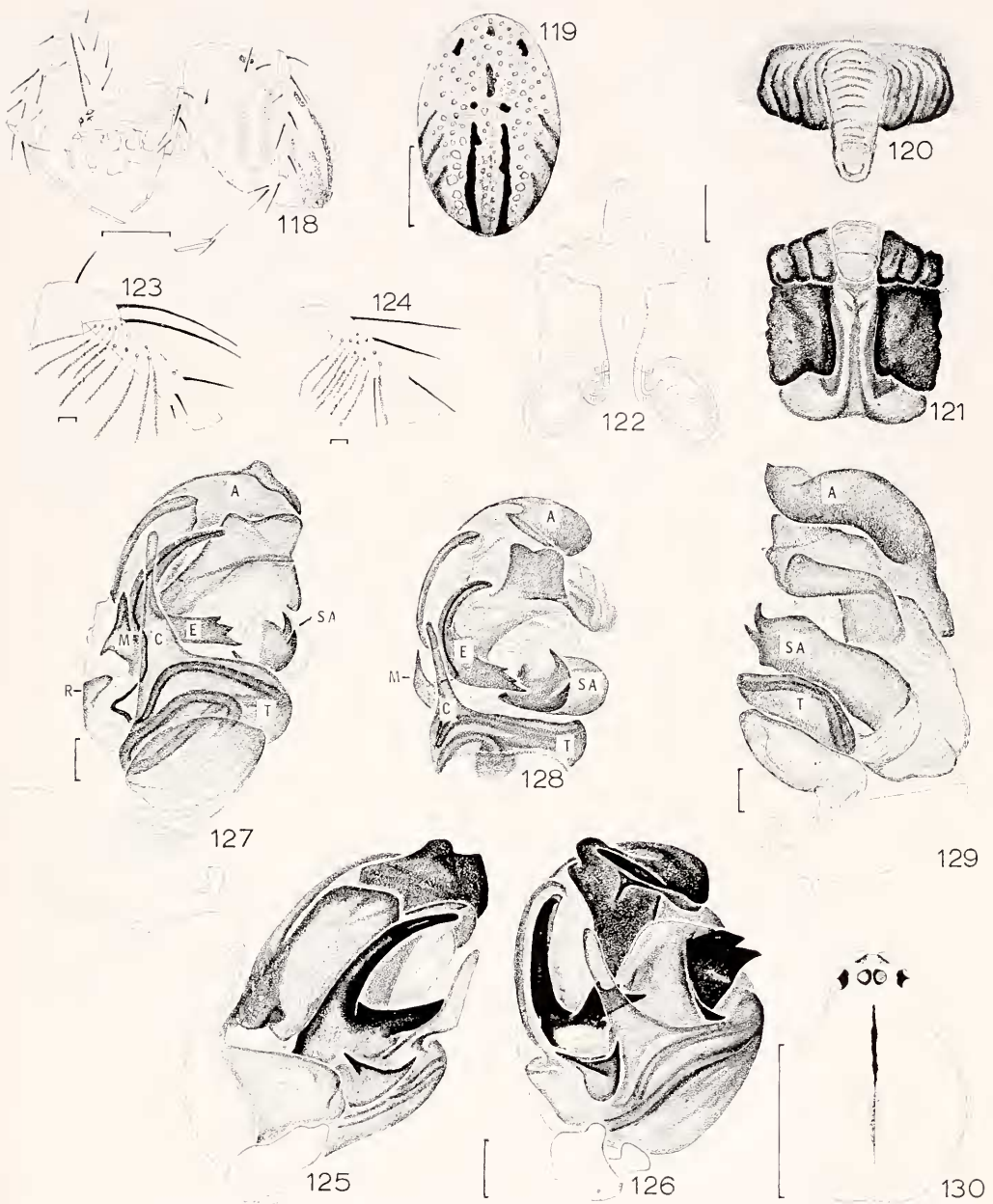
Mangora gibberosa (Hentz)

Plate 2; Figures 118–130; Map 4

Epeira gibberosa Hentz, 1847, J. Boston Soc. Natur. Hist., 5: 477, pl. 31, fig. 20, ♀. Types from Alabama in Boston Society of Natural History, destroyed. Emerton, 1884, Trans. Connecticut Acad. Sci., 6: 317, pl. 34, fig. 1, pl. 36, fig. 17, ♀, ♂. Keyserling, 1893, Spinnen Amerikas, 4: 241, pl. 12, fig. 180, ♀, ♂. Emerton, 1902, Common Spiders, p. 175, figs. 411–413, ♀.

Abbotia gibberosa, – McCook, 1893, American Spiders, 3: 240, pl. 20, figs. 7, 8, pl. 24, fig. 4, ♀, ♂.

Mangora gibberosa, – Comstock, 1912, Spider Book, p. 505, figs. 541–543, ♀, web. Comstock, 1940, Spider Book, rev. ed., p. 518, figs. 541–543, ♀, web. Roewer, 1942, Katalog der Araneae, 1: 775. Kaston, 1948, Bull. Connecticut Geol. Natur. Hist. Surv., 70: 239, figs. 743–744, 755–756, 2042, ♀, ♂, web. Bonnet, 1955, Bibliographia Araneorum, 2: 2708.



Figures 118–130. *Mangora gibberosa* (Hentz). 118. Female. 119. Female abdomen, dorsal. 120–122. Epigynum; 120. Ventral, 121. Posterior, 122. Cleared. 123. Female, left third patella and tibia, prolateral. 124. Male, left third patella and tibia, prolateral. 125–129. Left male palpus; 125. Mesal, 126. Ventral, 127–129. Expanded, 127. Ventral, 128. Ventro-lateral, 129. Lateral. 130. Carapace of female.

Abbreviations. A, terminal apophysis; C, conductor; E, embolus; M, median apophysis; R, radix; SA, subtegular apophysis; T, tegulum.

Size indicators: 0.1 mm, except Figures 119, 130, 1.0 mm.

Mangora ornata. —Archer, 1951, Amer. Mus. Novitates, 1487: 15, fig. 26, ♂. Erroneous determination, not *Theridion ornatum* Walckenaer. The latter name also is a junior homonym and was replaced by Roewer (1942) with *T. ornatulum*.

Description. Female from Wisconsin: Carapace, sternum, legs yellow-white, carapace with black median thoracic line, black rings around eyes. A longitudinal, ventral black line on the first and second femora (Fig. 118). Dorsum of abdomen with three longitudinal lines as shown in Figure 119. Sides with about four diagonal dark marks going from anterodorsal to posteroventral. Venter gray in center. Lateral eyes very slightly smaller than medians. Anterior median eyes less than one diameter apart, slightly more than one from laterals. Posterior median eyes about their radius apart, two diameters from laterals. Total length 4.0 mm. Carapace 1.8 mm long, 1.4 mm wide. First femur, 2.1 mm; patella and tibia, 2.3 mm; metatarsus, 1.8 mm; tarsus, 0.6 mm. Second patella and tibia, 2.0 mm; third, 1.2 mm; fourth, 2.0 mm.

Male: Coloration as in female. Carapace narrower in front than in female. Eye sizes similar to those of female. Anterior median eyes one diameter apart, slightly more than one from laterals. Posterior median eyes slightly less than one diameter apart, 1.5 diameters from laterals. Total length 2.6 mm. Carapace 1.5 mm long, 1.2 mm wide. First femur, 1.9 mm; patella and tibia, 2.0 mm; metatarsus, 1.7 mm; tarsus, 0.8 mm. Second patella and tibia, 1.7 mm; third, 1.1 mm; fourth, 1.7 mm.

Variation. Females vary in total length from 3.4 to 4.8 mm, carapace 1.4 to 1.9 mm long, 1.2 to 1.5 mm wide. Males vary in total length from 2.6 to 3.2 mm, carapace 1.5 to 1.7 mm long, 1.2 to 1.4 mm wide.

Diagnosis. The black lines on the venter of the first and second femora (Fig. 118) distinguish *M. gibberosa* from all other North American species except *M. fascialata*. In posterior view the epigynum of *M. gibberosa* is longer than wide with the borders of the median soft area parallel

(Figs. 121, 122), that of *M. fascialata* is square with the outline of the median soft area bottle-shaped. The seminal receptacles of *M. gibberosa* are oval (Fig. 122), those of *M. fascialata* have a lobe. The palpus of *M. gibberosa* has a unique two-pronged sclerotized embolus on the mesal side (Figs. 125-127).

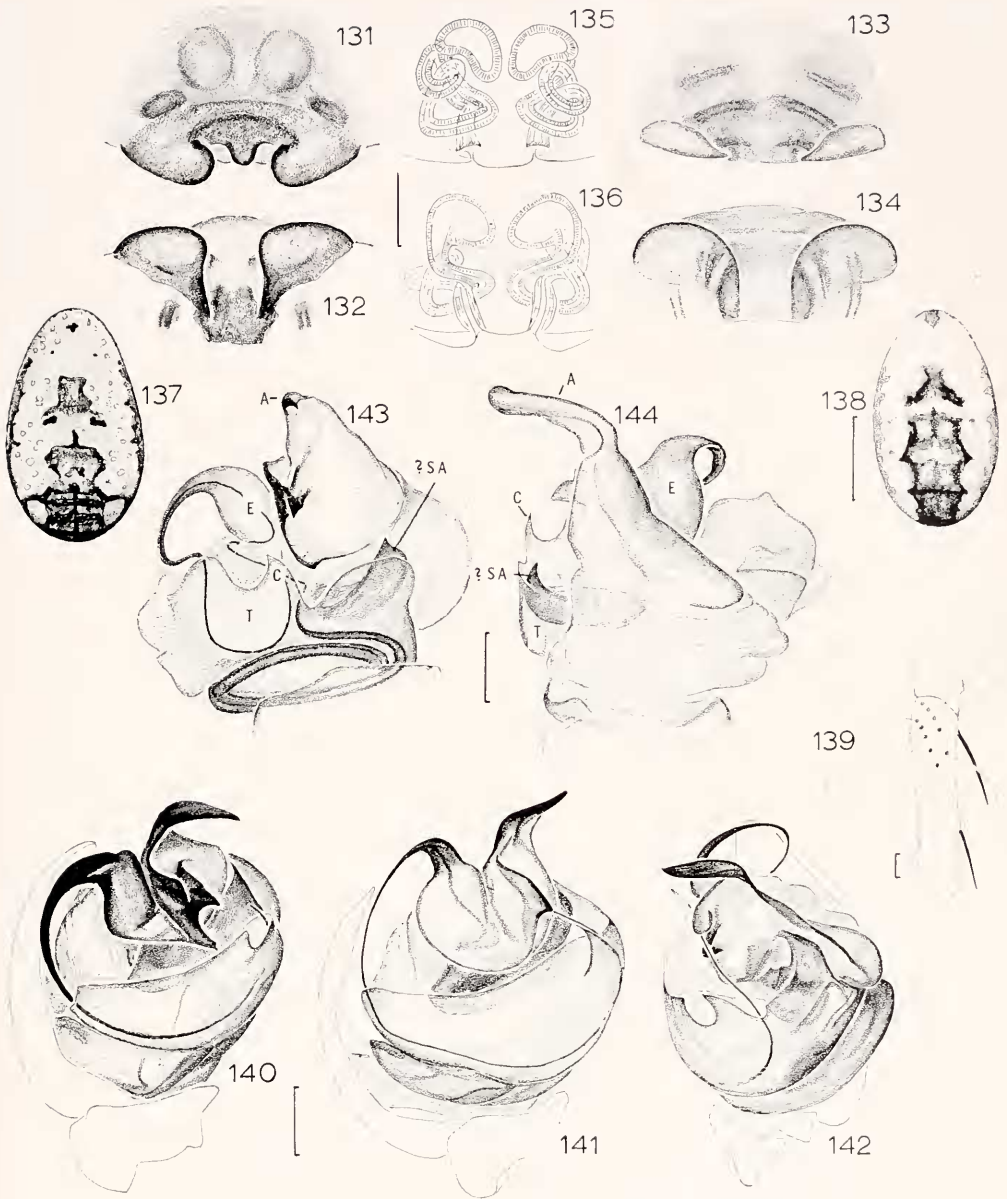
Natural History. *Mangora gibberosa*, unlike the three other common species in the eastern states, is more common in fields than in woods. It has been collected in herbs of deciduous forest in Kansas; in tall grass, deciduous woods and herbs in an orchard in Ontario; in upland forest in an old field, and along a road in Michigan; along a forest edge in New England; in a meadow in Georgia; in tall grass, in an old field, in low brush, and in dense undergrowth of high pine-turkey oak woods in Florida. Males are mature in July in northern Wisconsin, July and August in New England, June to September in New Jersey, May to June in Texas, April in Florida. Berry (1971, Amer. Midland Natur. 85: 528) had mature specimens from May to November in North Carolina. Adult females are found from June to September in the northern states, and April to November in Florida.

Kaston (1948) pictured the web (fig. 2042) with 50 to 60 radii and as many viscid strands below the hub. The web is 30 to 40 cm in diameter (Plate 2). The eggs are placed in rolled-up leaves. According to Kaston (1948), the eggs hatch in fall and the spiderlings leave the cocoon in spring.

Distribution. Eastern North America (Map 4) from Maine, southern Ontario, North Dakota to southern Florida and southern Texas.

Mangora calcarifera F.O.P.—Cambridge
Figures 131-144; Map 4

Mangora calcarifera F. O. P.—Cambridge, 1904, Biologia Centrali-Americana, Araneidea, 2: 479, pl. 45, figs. 12, 13, ♀, ♂. Two female, two male syntypes from Petexbatún, Guatemala in



Figures 131-144. *Mangora calcarifera* F.O.P.-Cambridge. 131-136. Epigynum; 131, 133, 135. Ventral, 132, 134, 136. Posterior, 135, 136. Cleared. 137, 138. Female abdomen, dorsal. 139. Female left third patella and tibia, prolateral. 140-144. Left male palpus; 140, 141. Mesal, 142. Ventral. 140: (Texas). 141, 142: (Guatemala). 143, 144: Expanded.

Abbreviations. A, terminal apophysis; C, conductor; E, embolus; ?SA, ?subterminal apophysis; T, tegulum.

Size indicators: 0.1 mm, except Figures 137, 138, 1.0 mm.

the British Museum, Natural History, examined. Bonnet, 1955, *Bibliographia Araneorum*, 2: 2708.

Description. Female syntype: Carapace yellow with a median dorsal longitudinal line and a lateral longitudinal band on each side in thoracic region; black rings around posterior median eyes. Legs not banded. Dorsum of abdomen with black marks as illustrated (Figs. 137, 138), and lacking white pigment spots. Sides of abdomen with two dark patches, one posterior to the other. Venter with only a black mark anteriorly and around spinnerets. Diameter of posterior median eyes 1.2 diameters of anterior medians. Lateral eyes 0.9 diameter of anterior median eyes. Anterior median eyes slightly less than their diameter apart, 0.7 diameter from laterals. Posterior median eyes slightly less than their diameter apart, slightly less than one from laterals. Total length 3.7 mm. Carapace 1.4 mm long, 1.2 mm wide, 0.7 mm high. First femur, 1.6 mm; patella and tibia, 1.8 mm; metatarsus, 1.3 mm; tarsus, 0.7 mm. Second patella and tibia, 1.5 mm; third, 1.0 mm; fourth, 1.6 mm.

Male: less distinctly colored than female. Eyes similar to those of female except laterals are relatively smaller than those of female. Anterior median eyes slightly less than their diameter apart, slightly less than their diameter from laterals. Posterior median eyes 1.2 diameters apart, slightly less than their diameter from laterals. Total length 2.4 mm. Carapace 1.3 mm long, 1.0 mm wide. First femur, 1.4 mm; patella and tibia, 1.6 mm; metatarsus, 1.3 mm; tarsus, 0.7 mm. Second patella and tibia, 1.4 mm; third, 0.9 mm; fourth, 1.4 mm.

Diagnosis. *Mangora calcarifera* is readily separated from other *Mangora* north of Mexico by the large posterior median eyes, by the lack of a scape in the epigynum (Figs. 131, 133), and by the long filiform embolus in the palpus (Figs. 140–143).

Mangora calcarifera can easily be confused with *M. trilineata*, also common in Mexico, and also having large posterior median eyes. However, in *M. trilineata* O. P.-Cambridge, the relatively large seminal receptacles show through the surface of the epigynum and there are short connecting ducts, and the male has a shorter embolus.

Variation. Northern specimens have less pigment and are lighter than those from central Mexico and Central America. The palpi show differences which may be geographic.

Natural History. The species was collected in a palm grove in southern Texas and from a river floodplain in Tamaulipas. Mature males have been found in March and September in Texas, July in San Luis Potosí, and April in Honduras.

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